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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Other communications relating to advertisements or general matters should be addressed to the Manager.

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Editorial & General Offices—8, Bouverie Street, London, E.C.4.
Telegrams: "Allangas, Fleet, London." Telephone: City 9852 (4 lines)

Inspection of Alkali Works

THE Chief Inspector's annual report, of which we publish this week our concluding abstract, is always of considerable interest to manufacturers and technical men, although during the last few years it has necessarily been somewhat restricted in its scope. Manufacturers sometimes glean from the report information regarding new developments or improvements effected in the works of others, an accurate guess being often possible when the district is specified. For example, on page 17 discreet reference is made to a continuous burner for spent oxide of the spiral gravity type. From the description it is clear to all who follow the patent literature on the subject that the furnace is that of Mr. Kershaw, of Messrs. F. W. Berk & Co., Ltd., and publication of the owner's name or the number of the corresponding English patent (No. 106,986) would not only have increased the value of this reference, but would, we feel sure, be approved by the owners, not only in this case but in most others of this kind.

The war period has demonstrated that interchange of information is often beneficial, and managers of factories engaged in similar branches of munitions work have been brought into more intimate contact than formerly. A guess on the basis of the report was, therefore, often unnecessary, and there seems no longer any reason to withhold from the general public the name of the works concerned, except by special request. Sulphuric acid works, sulphate of ammonia manufacturers, and others are to co-operate more fully through their respective national associations, and we hope to see a more tolerant spirit in regard to the publication of information and the mutual inspection of plant of general and even of special utility than was evinced in pre-war days. One of the first questions put by a manufacturer when considering the installation of new or improved plant is "Where can I see it at work?" yet having installed it, frequently as the result of special pleading or terms when it is the first of its kind, he usually refuses to show it to others after it is at work. This practice, particularly where increased efficiency results from the adoption of the plant or process, should be strenuously combated as being against the national interest, and there are very few cases where it can be justified even in the interests of the original purchaser who, after all, obtains a fair start over his competitors.

The report seems to us the natural vehicle for transmitting information of this kind, but to render efficient service, it should be published more promptly. The year 1918 is the period reviewed in the present report. The Chief Inspector presented it in "March, 1919," yet it only appears in print four or five months later! The work of the all too small inspection staff is so arduous and valuable that few will criticise the date on which the Chief Inspector presented his report, but the subsequent delay in publication appears to us unnecessary, and the omission of the actual date of publication unbusinesslike.

Turning to the subject matter of the report, the Chief Inspector's plea for full attention to chemical and physical control under the direction of competent and adequately paid men is one that we have already voiced and shall continue to press for. The shortcomings of men brought straight from the University to the works should be gradually made good as chemical engineering training is developed and appreciated in our universities and technical schools, and especially by chemical manufacturers. The fully qualified chemical engineer, on the other hand, will find scope chiefly as a liaison officer between the chemical and engineering staffs of the larger organisations, and in consulting work.

On page 22 it is shown that some 42 per cent. of the coke ovens of the country are still of the beehive type. Though in some cases the total quantity of coal available locally may not justify the capital involved in by-product recovery plant, we have here again a situation which calls for immediate action in the national interest. The present coal situation will, no doubt, have a salutary effect, but now that we are no longer dependent on German and foreign designers of modern coke-oven plant, we hope it will become a penal offence

to allow valuable by-products and gaseous fuels to be wasted even on account of decentralisation or the alleged shortcomings of by-product coke. Is it also too much to hope that the inspectors of alkali works will ultimately be empowered to report upon works which are carried on inefficiently and to have such cases dealt with by the corresponding trade organisations or other properly constituted authorities?

"Direct" Sulphate of Ammonia

In spite of the research which has been carried out during the war in connection with the synthetic production of ammonia, there seems little inclination in this country to go ahead with the matter on an industrial scale, and one wonders what is going to happen in connection with the project outlined for a factory on a large scale on the North-East Coast. Work was held up here by the Armistice, and little seems to have been done since. In view of the prevailing lethargy, it seems as though we shall still have to rely upon the coal-carbonising undertakings to fulfil our needs in the way of ammonia and its commercial compounds. Any schemes, therefore, which aim at more ready recovery are well worth studying at the present time. The Chief Alkali Inspector has been indefatigable in his endeavours to get to the bottom of the weaknesses of the "direct" process for recovering sulphate of ammonia, and in his reports for the last few years he has included most valuable particulars of special enquiries with regard to its working. Unfortunately, in some works the recovery figure is still disappointingly low, but in those establishments where the process has been made a special study further improvement has been effected. Efficiency with a process of the kind can only be expected when every attention is given to the number of small practical points which enter into the reckoning. Low ammonia recovery, in fact, arises from a large number of small losses rather than from a small number of large losses. As an instance of the progress which has been made, it is to be noted that at one works employing the "direct" method the recovery of sulphate of ammonia was only 18½ lb. per ton of coal dealt with in 1915, whereas in 1918 the figure was augmented to 24 lb.

The ideal to be striven for is, of course, some means of treating the hot coal charge with steam, or a gas rich in hydrogen, so as in the first place to increase the proportion of nitrogen in the coal which is recoverable as ammonia. That this is possible is illustrated by the high ammonia yield obtained with the Mond producer, although the necessity for generating a high-quality gas in the ordinary practice of coal distillation precludes the adoption of the Mond methods. Having increased the ammonia yield, the next proposition is to devise a really practicable process permitting of the combination of the sulphur of the coal directly with the ammonia. Several methods which appear most alluring on paper have been introduced for the purpose; but the working difficulties are legion, and the apparatus usually entails a battalion of chemists and testers to prevent it from going awry. However, progress is being made, and although the majority of these ornate processes have been products of the German brain, we notice with satisfaction that the Report speaks of the erection of a plant for the same purpose which is entirely due to Professor Cobb, of Leeds. This plant, although of a comparatively small order, is now completed, and is undergoing its trials on a full works scale. Briefly, the process consists in treating coal gas with a solution of zinc sulphate, whence zinc sulphide is precipitated and sulphate of ammonia is formed in solution. On filtration the sulphate of ammonia is recovered by evaporation. The precipitated zinc sulphide is roasted, and the roaster gases (with an excess of air) are blown through water which contains in suspension zinc oxide from a previous roasting. Thus the zinc sulphate is regenerated and the cycle is completed.

Coal and Chemistry

It is clear that the chemical industries must be seriously affected by the increased price of coal, on which we have already commented. Not one of the metal trades, with the possible exception of aluminium, or of the staple heavy chemical industries, can hope to operate successfully with the extra 6s. per ton. Although judicious fencing and hedging by means of protective tariffs may permit the newly founded fine chemical industries to survive the period of stress, yet no industry can be saved except by its own endeavours, both in home and export trade. It is, of course, a matter primarily of political outlook as to whether nationalisation is a good or bad thing, or whether, with the present system condemned, a coal guild could reasonably hope to prove a tangible solution of the difficulty in a land where the legal, the medical and possibly (curious as it may appear) the banking professions are the only corporate bodies which are slightly imbued with the guild spirit.

Taking matters as they stand, it is to be hoped that, whatever temporary expedient or ultimate solution is found for the grave problem under consideration, the chemist will be able to demand that certain steps shall be taken to utilise our natural wealth to the best advantage. There are, of course, many and varied directions in which reform, always cogent, has now become urgent if not indeed vital. For example, the buying and selling of coal for heating purposes should be conducted on analysis, a matter of routine on the Continent, and becoming increasingly popular in the United States. It might also be possible to legislate, at any rate in certain municipalities, against the unrationed consumption of coal in the open grate. In England we prefer the open fire with its eight per cent. thermal efficiency to the more hygienic and efficient gas, electric, or central heating systems, but the use of an open fire might be restricted to one room in each house, utilising other forms of heating where it is desired only in a strictly utilitarian capacity. Again, legislation on the compulsory semi-carbonisation of all coal hewn would be an alternative solution to the problem, thus compelling the recovery of some of the by-products, including those most valuable at the present time, and providing a fuel capable of easy ignition and practically smokeless combustion. Reform on a vast scale is further much to be desired in the coking industries and in the increased utilisation of powdered coal for steam-raising purposes, whilst the agitation should provide a useful stimulus to the intended legislation on the production of "economic" gas.

An Agricultural Laboratory

THE cultivation of the research spirit in connection with industry is so important that any sign of its growth is to be welcomed. One interesting sign in this direction is the announcement that Mr. Joseph Watson, of Wetherby, near Leeds, is establishing a large agricultural laboratory in Warwickshire, and that it is proposed to devote about £15,000 a year to research work. His purpose, he says, is to increase the crop on the land, and with a view to increased meat production at the lowest possible price he intends making extensive investigations into the question of feeding animals. This, we gather, is a purely private enterprise and a good example to leaders in industries which are dependent more or less on applied chemistry. During the last quarter of a century an immense advance has been made in the science of agriculture, through the agricultural departments of colleges and through the enterprise of private firms. We are not quite sure whether Sir James J. Dobbie, when on the staff of the Bangor University College, was not the first to take up the work of extension lectures and experiments. At any rate, he was one of the early workers for the closer association of science and practice in agriculture. The early prejudices of those who had worked by "rule of thumb" against being re-taught the principles of their vocation by the scientific man have almost disappeared, though the active recognition of the practical value of science is not quite so general as one could wish. In the field of agriculture there is an almost unlimited scope for the application of chemical knowledge, with a view to the replenishment of the exhausted fertility of the soil, the increase in the productive power of the land, the successful treatment of pests and disease, and the rapid fattening of stock. Farmers have begun to realise that the chemist has more to teach them about their business than they had any idea of, and Mr. Watson's experiment is one to be commended to the notice of the agricultural community.

Recognition of Chemical Science

THE Institute of Chemistry, among its other useful activities, is at present engaged in negotiations with the Ministry of Labour with a view to devising means whereby the importance of chemical science to industry may be better realised by both employers and employees, and the interests of chemists themselves safeguarded. This seems to us work of quite a practical and promising character. The Institute has done much to raise the standard of scientific qualification for the practice of chemistry, and has sought concurrently to establish a corresponding standard of remuneration. It has done this mainly by creating a favourable atmosphere and by gently fostering in the individual chemist a conviction that he is worthy of his hire. The new movement places the matter on somewhat broader ground, and Sir Robert Horne may be expected, as a member himself of a learned profession, to sympathise with a demand for more generous recognition, and as Minister of Labour to see the advantage of a more liberal application of science to industry. His position and training fit him for the position of liaison officer between the two interests, and nothing but good can result from this new effort to make both realise the extent to which they are mutually dependent on each other, and the advantage to themselves and to industry generally of closer collaboration.

Patent Law Reform

PATENT Law is such a complicated business that it is often easier to demand reform than precisely to specify it, but a few clear points emerge from the discussion of the subject at the Central Hall conference last week. The first is Sir Robert Hadfield's suggestion, warmly endorsed by Lord Moulton, that we should have all the files at the Patent Office open, as they are in America. The second is the grievance of allowing foreigners to acquire patent rights in this country for the development of their own trade abroad and the restriction of trade here. Lord Moulton's principle that the effect of granting patents should be to help instead of hindering the trade of the country is almost too obvious to need statement. Then there is the financial problem—whether it is right that, as stated at the conference, a profit of roughly £10,000 a month should be made out of hopeful inventors. It seems to us that the Patent Office should be expected to pay its way, but should not be run as a dividend-earning department. Objection has been urged particularly against the renewal fees, but against this we have Lord Moulton's testimony that at least 40 per cent. of the patents issued are quite worthless, and that the renewal fee acts as a sieve for weeding out what even the authors themselves regard as worthless, and to that extent liberates other inventors from restriction. While the industrial rights of the patentee need to be protected, the great need is to give British industry the fullest advantage of really useful inventions, and though the equitable recognition of both interests is not always easy it ought not to be impossible.

Alcohol from Sulphite Liquor

THE Forest Products Laboratory at Madison, Wis., is reported to have obtained some interesting results from a series of investigations into the production of ethyl alcohol from sulphite pulp mill waste liquor. It was found that of the 2.0 to 2.9 per cent. total sugars found in waste sulphite liquor, about 55 to 62 per cent. is fermentable, and upon fermentation go to form ethyl alcohol. Fermentations of the sulphite liquor conducted on experimental and commercial scales showed a production of 0.7 to 1.15 by volume of actual alcohol. A plant with a capacity of 100,000 gallons of waste liquor would thus be able to produce 700 to 1,150 gallons of absolute alcohol per day. Since the alcohol produced form this source contains a small portion of methyl alcohol, no further denaturing is necessary. So far as yeasts are concerned, a comparison showed that a yeast acclimated to sulphite liquor just prior to fermentation gave higher yields of alcohol than one which had been permanently acclimated to this liquor. The cost of the former process was, however, found to be so high as to prevent its use. This fact led the laboratory to acclimate permanently a strain of beer yeast to this liquor, and a culture was produced which gave results comparing very favourably with those obtained with the use of a freshly acclimated yeast.

Recent Developments in Industrial Catalysis

By Dr. Hugh S. Taylor.

The first portion of Dr. Taylor's article dealing with the above subject was published in our issue of August 2.

II.

THE development of technique in catalytic hydrogenation and dehydrogenation has resulted in the newer methods for synthetic production of fuels, especially fuels designed for use in high-speed internal combustion engines. The development of the motor industry has taxed severely the production of the oil fields of the world in regard to the lower boiling fractions of the hydrocarbon mixture. The limits of the distillation "cut" for petrol have gradually been increased to cope with the increasing demand, and more economical methods of working have been introduced. Furthermore, by special processes the natural gas obtained on the oil fields is being submitted to a stripping of its content of higher homologues and the heavier fractions of petroleum spirit are being submitted to processes of thermal degradation or "cracking" to yield more volatile products. In face of such conditions it is but natural that the fuel producers have looked for other sources of fuel suitable for use in the motor transport trade. In the supply of their needs the agency of the catalyst is destined to play an increasingly prominent part. The "cracking" processes are, in the main, reactions involving dehydrogenation, in which, therefore, the effect of temperature should be markedly influenced by the nature of the agent in contact with which the operation is conducted. The utilisation of benzol, which is now accumulated in considerable quantities from the by-product coking industry, from coal-tar distillation, and from the stripping of town's gas as carried out during the period of war, can be expected as a supplement to petroleum hydrocarbons. Mixtures of this product with alcohol behave more efficiently in the motor engine than does the single substance, so that corresponding increase in the consumption of fuel alcohol may be expected. The catalytic agent is utilised in all processes of alcohol production. In the fermentation processes from starches, the agent is the enzyme present in the yeast cells. By the hydrolysis of cellulose, the principal constituent of all forms of wood waste, using acids as catalytic hydrolytic agents, fermentable sugars are obtained which may be converted into alcohol by the normal processes of fermentation. The sulphite liquors obtained in the manufacture of pulp by the sulphite process also contains fermentable sugars and so also have been utilised for alcohol production. Finally, synthetic alcohol may be produced by a combined catalytic hydration and hydrogenation process starting from acetylene generated from carbide. Certain aspects of these catalytic processes may be developed.

Synthetic Alcohol.—Attempts to synthesise alcohol from acetylene, generated from calcium carbide as outlined in the earlier paragraphs of the section, have been enormously stimulated in recent years by the necessities of war; the shortage of liquid hydrocarbon fuels in the Central Empires, in Switzerland and Scandinavia, has prompted the experimental work in those countries. In England, the production of acetaldehyde, the first step in the synthesis of alcohol from acetylene, has been encouraged by the enormous demands for acetic acid and acetone in the explosive and aeroplane industries. The development of the process for the production of fuel alcohol will follow when the shortage and consequent increase in the price of petrol for internal combustion engines permits economic exploitation. The increasing consumption of industrial spirit in the chemical industries of the country, which in 1917 reached a total of upwards of four million gallons, offers an immediate outlet for present production.

Acetylene may be converted into acetaldehyde by a process of catalytic hydration:

$$CH \equiv CH + H_2O = CH_3CHO.$$

Presumably the reaction occurs in two stages: the first, being the formation of an unsaturated alcohol, followed by the shift of the labile hydrogen atom to yield the aldehyde as represented by the scheme:

$$\begin{array}{lll} CH & CH.OH & CHO \\ \vert\vert\vert + H_2O & \vert\vert & \vert \\ CH & CH_2 & CH_3 \end{array}$$

To accelerate the hydration process various catalytic agents have been employed. The normal catalytic agent for processes of hydration or hydrolysis, is a strong acid. It is, therefore, not surprising to learn that, according to the Griesheim Elektron Co.'s French Patent No. 474,246/1915, the acetylene is to be led into hot 20-25 per cent. sulphuric acid or 30-35 per cent. phosphoric acid or solutions of organic sulphonic acids. As promoters of the reaction, the addition to the acid solution of the mercury salts of the corresponding acid is claimed. In English Patent No. 5132/1915 the use of glacial acetic acid at 80-90° C. containing a dissolved mercury salt is suggested, acetylene and water to be led in together. A similar claim is embodied in the Swedish Patent No. 42,331/1917 of the Consortium M. Mugden. Accelerators in the form of mixtures of salts, such as ferric sulphate and mercuric sulphate, in presence of a hexavalent chromium compound such as chromic acid, are suggested by the Meister Lucius and Bruning U.S. Patents, Nos. 1,151,928 and 1,151,929/1915. According to the Drefus patents (*e.g.* French Patent No. 479,656/1916 and British Patent No. 105,064/1917) which have been operated in the production of acetaldehyde and acetic acid from acetylene, the gas is passed with water (*a*) into solvents in which mercury is soluble, *e.g.* sulphuric, phosphoric and acetic acids; or (*b*) into solvents in which acetylene is soluble, *e.g.* acetone. In the former case, one or more of the following conditions are observed: (1) with sulphuric acid, a concentration limit of 5 to 20 per cent. is set; (2) the absorbing solution contains less than 20 per cent. of the mercury compound; (3) throughout the absorption, the liquid is kept below 60° C.; (4) the acetylene is introduced in such quantity that it is all absorbed; (5) the acetylene is at first introduced slowly until the mercury compound becomes grey or greyish-black; (6) after a quantity of aldehyde has been formed the introduction of the gas is stopped, the temperature raised, aldehyde is distilled off, after which the temperature is again lowered and the process repeated; (7) the gas employed is purified from sulphuretted hydrogen, phosphine, ammonia and similar poisons; (8) water is added throughout the reaction in order to keep the acid concentration constant; (9) the mixture of gas and liquid is strongly agitated to ensure intimacy of contact; the gas being under a slight positive pressure. The process is carried out in apparatus constructed of or lined with lead, the surface of which is previously coated with a layer of lead sulphate or basic lead sulphate by treatment with sulphuric acid or mixtures of sulphuric and nitric acids. Provision is made for cooling the reaction mixture, either externally or internally, with cooling pipes similarly protected against action of acid. The Union Carbide Co., in U.S. Patents Nos. 1,213,486 and 1,213,487 of 1917, claim for the passage of acetylene into a dilute solution of sulphuric acid, a mercury salt and the salt of a weak acid,

e.g. a borate, or alternatively into a solution of the mercury salt and the acid salt of a strong acid.

The reduction of the aldehyde to alcohol is accomplished by the ordinary process of catalytic hydrogenation following the standard procedure of Sabatier. By passage of the aldehyde vapour in admixture with hydrogen over a contact agent composed of reduced nickel, the reduction takes place readily.

$$CH_3CHO+H_2=CH_3CH_2OH.$$

The reaction temperature is 140° C., and dry aldehyde vapour and hydrogen are employed. The completeness of the reaction is limited by the reverse process of dehydrogenation of the alcohol produced. The Longa Electricity Works at Visp in Switzerland, which will shortly be in a position to cover the total alcohol consumption of Switzerland with the synthetic product, reduces the tendency towards dehydrogenation by employing a large excess of hydrogen gas and using a circulatory process, the hydrogen returning to the incoming vapours after condensation of the alcohol. With careful control, a conversion of over 80 per cent. of the aldehyde is possible in a single passage through the catalyst medium. Temperature control must be most rigorous owing to the possibility of catalytically accelerated side reactions resulting in the degradation at a temperature of 180° C. of acetaldehyde to methane and carbon monoxide :

$$CH_3CHO=CH_4+CO.$$

This reaction is most marked in the case of the corresponding formaldehyde :

$$H.CH.O=H_2+CO,$$

and accounts in large measure for the low yields in the preparation of that compound from methyl alcohol.

The production of alcohol via acetylene and acetaldehyde does not exhaust the possibilities of the synthetic processes. Large scale production of ethylene would lead to the development of a synthesis by a process of direct hydration :

$$C_2H_4+HOH=C_2H_5OH.$$

Attempts to produce ethylene by hydrogenation of acetylene do not, as yet, appear to have been successfully applied technically. Removal of the ethylene hydrocarbons from coal gas has also been attempted, but has resulted in unsatisfactory operation in the subsequent hydration process. For this latter reaction, the use of a catalyst is invoked; the principal agent employed being sulphuric acid, the synthesis to alcohol, as with the dehydration process, occurring via the intermediate ethyl sulphuric acid $C_2H_5 . HSO_4$.

Alcohol from Wood Waste.—The conversion of wood cellulose to alcohol is a two-stage reaction : (*a*) the hydrolysis of cellulose to give reducing and fermentable sugars, a hydrolytic process which is accelerated by catalytic agents, principal among which are the acids, as observed so early as 1819 by Branconnot; (*b*) the fermentation of the sugars after neutralisation of the acid liquors in accordance with standard fermentation practice to convert the fermentable sugars to alcohol and carbon dioxide.

The hydrolysis of cellulose may be effected by one or other of two processes. Thus, as exemplified in the French patent of Ekstrom (F.P. 380,358/1907) the cellulose may be dissolved in concentrated acid, hydrolysis being effected on subsequent dilution. A treatment with 95 per cent. sulphuric acid followed by digestion for a period of one to five hours, gives, according to Ekstrom, a high conversion of cellulose to sugar. The high cost of acid and the expense and labour of recovery have prevented the commercial application of the concentrated acid process until the present.

In the dilute acid process, Simonsen in Sweden began a series of researches in 1889 which served to elucidate many of the difficulties associated with the process and finally resulted in successful large scale laboratory experiments. The technical development was, however, unsuccessful. Simonsen employed dilute sulphuric acid of 0.5 per cent. strength and a working pressure of nine atmospheres. The ratio of wood to dilute acid liquor was one part to four parts. Digestion for an hour was said to give sufficient fermentable sugars to yield alcohol equal to 6 per cent. of the dry wood employed.

Classen, early in the present century, suggested various modifications of the general process by the use of strong acids under heat. He further directed attention more particularly to the use of sulphur dioxide to produce sulphurous acid as hydrolytic agent, and recent efforts in a technical direction have been concerned with the use of volatile acids as catalytic agents, such as hydrochloric and sulphurous acids.

The Ewen-Tomlinson process is apparently the only method of alcohol production which has attained to demonstration as technically and economically sound, as much as 95,000 gallons of high grade 95 per cent. alcohol having been produced in the plant of the Standard Alcohol Co., at Fullerton, La., at a cost, according to Little, of not more than 10d. per gallon. More recent reports show even higher production figures. The feature of the Ewen-Tomlinson process is the low moisture concentration employed, which makes for economy in the subsequent neutralisation and concentration operations, as well as for greater ease of control of the time-temperature factors of the process, which is of prime importance. The hogged wood with about 50 per cent. moisture content is loaded into a rotary digester having an acid protection and heat insulating lining. Sulphuric acid is sprayed upon the wood in relatively small amounts, giving a concentration not greater than 1 per cent. Steam is then admitted to the digester, and the required temperature attained as quickly as possible, the reaction, which is extremely rapid, being then stopped by release of pressure and emptying of the digester contents. Operating steam pressures of 75–100 lbs. are employed for heating purposes. The 50 :50, acid liquor : wood ratio is below the saturation limit of the hogged wood which can, therefore, be handled in conveyors as with the original sawdust.

The separation of the sugar from the woody residue, not unlike coarse coffee grounds in appearance, is effected in standard beet sugar diffusion batteries provided with suitable acid proof linings. Neutralisation of the acid liquors is generally attained by means of lime, milk of lime, or a high-grade limestone. The fermentation of the sugars is carried out in accordance with standard practice with a four-day fermentation period. After the diffusion process the spent wood, amounting to 70 per cent. of the original wood, goes to a press for removal of excess water and is then available as a fuel.

In the waste sulphite liquor process the main problem is the neutralisation of the acid liquor prior to fermentation. Most recent Swedish practice employs freshly slaked lime for the preliminary stages of the neutralisation process during which the liquor is vigorously aerated. This is followed by a completion of the neutralisation by the addition of finely-pulverised limestone. A considerable excess of this latter is required owing to the formation of a protective coating of sulphite on the carbonate. The sludge may, however, be used several times because the sulphurous acid in the more acid liquor first dissolves off the layer of sulphite, thus exposing the carbonate again to take part in additional neutralisation. In this way, a sludge, after being used six times, showed less than eight per cent. of carbonate.

Hexahydro Benzene.—The utilisation of benzol for motor fuels has stimulated the investigation technically of the catalytic process of hydrogenation to yield hexahydrobenzene. The United States Bureau of Mines have reported that a fuel composed of such a mixture of benzol and hexahydro benzol gave indication of marked superiority over any other product that was examined as material for an aero-

plane fuel. For the motor industry the mixture would be in every way preferable to the unreduced benzol or to mixtures of benzol with alcohol or with petrol. As prepared at present, hexahydro benzene is obtained by catalytic hydrogenation of benzene by hydrogen gas in presence of a nickel catalyst at a temperature in the neighbourhood of 180° C. The reaction is rapid and complete in a single passage over the catalytic agent. Without doubt, in the near future, rapid development of this industry may be anticipated. The previous discussion of promoter action would suggest that possibilities of technical improvement will be obtained by the employment of mixed catalytic agents resulting in lower operating temperatures and simplification of the reaction technique. In this way catalysis is contributing in ever-increasing measure to the development of modern chemical industry.

State Aid for Industrial Chemical Research

By E. de Barry Barnett, B.Sc., A.I.C.

Mr. de Barry Barnett is best known as the author of two volumes which have appeared in the series of technical handbooks edited by Dr. Samuel Rideal. He gives below his own views on the State endowment of industrial research, and offers suggestions for conducting our chemical processes on more economic lines.

Not only has the war shown to what extent this country has been dependent on imports of chemicals and chemical plant, but it has demonstrated also that the establishment of chemical industry on a firm basis is vital in the interests of national safety. Quite apart from all ordinary considerations of peace-time economics, a vigorous and healthy chemical industry is an excellent insurance against war. Modern warfare is largely a chemical struggle, and a country, however aggressive it might feel, would hesitate in attacking a State in which chemical industry was at a high pitch of perfection.

In pre-war days there was but little chemical industry in Great Britain, and the problem now is as to what steps should be taken to establish one. One must not be blinded by the fact that many of the war plants are of the extempore order, and although capable of producing many substances not manufactured in this country before the war, can do so only at a price which even the high cost of labour and material cannot explain. Will these plants be able to compete with the best Continental practice when imports are unrestricted? It is extremely improbable that they will, and an industry that can only be bolstered up by artificial economic barriers in the way of prohibitive import duties cannot be said to be in a flourishing condition and cannot be expected to capture much foreign trade. Import duties will no doubt be a great help when nursing the industry in its infancy, in protecting essential key industries, and preventing dumping at below cost so as to squeeze out competitors. But in establishing an industry, efficiency, that will render it self-supporting, and which will allow it to meet foreign competition on equal terms, must be aimed at.

Many people delude themselves with the belief that because this country beat the Germans in the production of munitions, nothing is to be feared. It is true that many synthetic drugs, some of them of complicated structure, have been produced at a price, and that a certain amount of progress has been made in the production of dyestuffs, but so far the surface of the problem has scarcely been scratched. The writer's firm opinion is that man for man the average British chemist can beat the average German chemist, but there are twenty chemists in Germany to every one in Great Britain, and providence is notoriously on the side of the big battalions. Besides, Germany has at least forty years' start, forty years of research, forty years of technical experience.

The Need for Research

The great necessity is Research, not only in pure chemistry, but also in the application of chemistry to industry. British chemical manufacturers have never shown any great love of research, and it would be folly to assume that they have now completely changed their methods. In any case, capitalists in this country have always fought shy of laying out money on any process unless exact manufacturing and selling cost can be guaranteed with reasonable certainty. There may be exceptions, but anyone who has tried to interest capital in the development of a process that has not been freely tried will recognise the great difficulty experienced. If, on the other hand, it can be shown that the process has been worked on a reasonable scale which allows of proper costing, and that the product finds a ready market, the attitude of capital is much more favourable. For example, the coke-oven and blast-furnace owners in this country take no interest whatsoever in proposals for manufacturing chemicals, although millions of cubic feet of surplus gas are going to atmosphere for lack of profitable use. Take ultramarine for example. There is a huge sale for this pigment, which is manufactured by roasting china clay with sodium carbonate or sulphate, sulphur and some form of carbon (coke, pitch, or anthracite). The materials are all cheap, and the chief cost of manufacture lies in the fuel. In pre-war days the whole consumption was imported from Germany, and although ultramarine is now being made in this country to some extent, the demand is not freely met, and the price is £80—£100 per ton. It is an industry that might well be run in conjunction with blast-furnaces or coke-ovens, the surplus gas being used for firing the kilns and for generating the necessary power. Unfortunately the details can only be worked out on what is practically a manufacturing scale, laboratory experiments being useless. Probably if heads of industrial firms were given full manufacturing details, an experienced staff, and a working plant to copy, things might be different, but nothing has yet been done. It is clear that there are many manufactures in which fuel is the chief item in the cost sheet, and many of these might well be started in connection with blast-furnaces and coke-ovens where surplus gas is available. As mentioned above, ultramarine is one example of such a manufacture, and chromate and bichromate are another. As electric power can be generated from surplus gas at what are almost water-power rates, there would seems to be an excellent chance of establishing electro-chemical industries such as carbide manufacture on a remunerative basis.

An Industrial Research Station

Manufacturing details connected with the newer processes could best be supplied by setting up a national research station for the investigation of industrial chemical processes. Such an institution would ascertain what products it was desirable to manufacture in the country, and would then examine the processes by which such products could be made. The work would not stop at the laboratory stage, but would be carried further in plant of reasonable size, which would allow practical manufacturing details to be determined, and which would furnish reliable cost data. Problems of filtration, evaporation, &c., would be freely worked out, analytical methods for testing the raw material and product and for controlling the process established and all the chemical and engineering data required for the establishment of the manufacture tabulated. The information thus obtained would be available to any firm wishing to manufacture the particular chemical in question, either free of charge or on the payment of a reasonable fee. New processes discovered might be patented, and licences for the use of the patents granted, thus making the research institute self-supporting to a considerable extent.

The research station would be staffed largely by chemists who had just taken their college degree. These men would carry out the necessary work under the direct and personal supervision of older and more experienced men, and would thus get that insight into practical manufacture that can never be acquired at a university or technical college. After assisting in working out a process, they should be free to enter the service of any firm taking up the process. By this means a race of highly trained technical chemists would become available, a state of things which would be of great

value to the country, and which would also go far towards improving the status of the chemist.

The proposed institute would not confine its attention solely to the manufacture of new products, but would also investigate what are at present waste products, and would endeavour to find profitable uses for them. With this object in view it might be desirable to make compulsory a periodical return by all manufacturers showing what waste products were being produced, and the amount and nature of these. Investigation on purely chemical engineering points would also naturally be undertaken, such as the best composition of iron for resisting acids and other chemicals, acid-proof alloys, &c.

A Suggested Scheme

Of course, such a scheme could not be set going without a considerable expenditure, but the money would be well spent, and the benefit derived by the nation would more than repay the cost. The experimental station would have to be built on reasonable lines, as mere laboratory accommodation would be almost useless. Of course, well-equipped laboratories would be an essential part of the scheme, but only a part, the real basis being the provision of ample facilities for trying-out the processes on a manufacturing scale where the would-be manufacturer could see his future plant working in miniature. The establishment of a synthetic dye industry has recently received much attention, and the proposed institute could render great assistance in this direction. Smaller dye manufacturers have but little chance at present owing to the multiplicity of "intermediate products" required. The cost of working out details of the manufacture of these is high when it is considered that probably only a few tons a year of each is required, and partly for this reason the manufacture of dyes will tend very strongly to become a monopoly in the hands of the present combine. If, on the other hand, manufacturing details were available, the smaller firms would have a much better chance, and it is extremely probable that owners of coke-ovens would take up intermediate product manufacture and thus render available a supply of these substances both to the smaller firms and to the combine. An open supply of intermediates would go far towards preventing the establishment of a monopoly in dyestuffs.

It may be urged that the establishment of research on a national basis would kill individual effort, but the very opposite would more likely be the case. The stimulation of industry would give practical proof of the value of research, and the general raising of the standard of efficiency would compel the larger undertakings to guard their interests by carrying out research, so as to maintain their supremacy. In the research world there is plenty of room for all comers, so that there is no fear of overcrowding.

At the present moment the country has an unprecedented opportunity for establishing a chemical industry. There is little sentiment in business, and a country that relies on the present hatred of everything German is asking for trouble. In any case other countries are going ahead, and unless Great Britain intends being left out of the race, it is time to stop talking and get to work.

Patents in Relation to Industry

Demands of Patent Law Reformers

A LARGELY-ATTENDED conference of manufacturers and others interested in the patent law was held at the Central Hall, Westminster, last week, in connection with the British Scientific Products Exhibition, when the subject under discussion was "Patents in Relation to Industry." Lord Moulton presided.

Open Files as in America

Sir Robert Hadfield, in opening the discussion, said that only that morning he attended a special committee of the Federation of British Industries which was trying to voice the opinions of most of them in an official way. Personal agitation was not of very much use nowadays. One had to get collective organisation in order to secure a change. The Federation entirely backed up the idea of having a much longer term of years granted to them for patents. They agreed to support the "file wrapper" system, which permitted more open examination of the report on applications made for patents. He found the system of very great service in a case with which he was concerned in America. If he had not been able to inspect the file wrapper it would have resulted in a very heavy cost in litigation. The Federation also supported the view that a Judge who tried patent cases should have some special knowledge.

It did seem an anachronism, observed Sir Robert, that a Britisher could not get as good and as long a patent as an American. It was suggested that if fees were reduced by one half it would be a very great advantage. As to the Empire patents, it was thought that it was rather too late to press that particular point in the Patents Bill now under consideration Another point which the Federation was introducing was that the publication of a paper read before a learned society should not debar a man from obtaining a patent.

Mr. Walter F. Reid, chairman of the Institute of Inventors, said that the State ought not to tax an inventor at the beginning of his work, but ought to assist him in every way. That was not done, and it was not the view of those who drafted the Bill now before Parliament. The previous Bill last year was withdrawn after representations made to the Board of Trade. Many of the weak points in that Bill had been repeated in the present one, and would be a very serious obstacle to future progress of invention in this country.

Mr. Hunter Gray said that it was almost appalling that even within the last 10 days a Patents Bill has passed its second reading in the House of Commons without a word being said on behalf of the inventors.

Mr. W. M. Mordey said that the infant mortality of patents was very high, only 40 per cent. of them surviving their first four years. Only four or five per cent. of them lived out their full term of 14 years. That no doubt was very largely the result of the high renewal fees. He had analysed 10 years of the workings of the Patent Office, and he found that the annual revenue was something over £300,000, and the expenditure was something under £200,000. That was to say, the official financial return of the Patent Office showed that it was taxing the inventor to the extent of £10,000 a month. Out of the £300,000 of revenue no less than £173,000 a year was received in the form of renewal fees—practically all taxation.

Sir G. Croydon Marks urged concentration on bettering the present Bill in Committee. The Bill needed amendments, but it gave some of the improvements they asked for.

Lord Moulton's Views

Lord Moulton said that they had heard of the gifts inventors had given to the country, but there had not been scarcely a word to suggest that they were paid for by the country consenting to put itself under a restriction for 14 years from using ideas which might well occur to it. If they wanted to convince the public, they must show that they realised that, and that the claims of the inventors not only overtopped that, but overtopped it so much that more liberal terms ought to be given. When they heard of the tens of thousands of patents which were taken out in the year there was not a man on his side of the table who did not know that 50 per cent. of them were rubbish and that most of the others were of very little value. The public was suspicious when those inventions were protected by patents and so few of them really were meritorious.

The theory of renewal fees was excellent. They got their four years for a trifle. Then the nation asked them, "Are you willing to give £10 for another year for a monopoly of your invention?" Ninety-five per cent. said, "No, it is not worth £1c." Therefore the bulk of the inventions they were speaking of were realised even by the inventors to be of no special advantage to the country, and his experience of them was that a very great percentage were things which it would be in the interests of the country to sweep away. He was not talking about renewal fees as a method of taxation, but they were a valuable test as to whether the invention was of special utility. Those patents if they were not valuable restrained invention. He was delighted with Sir Robert Hadfield's suggestion that they should have all the files at the Patent Office open, as they had in America.

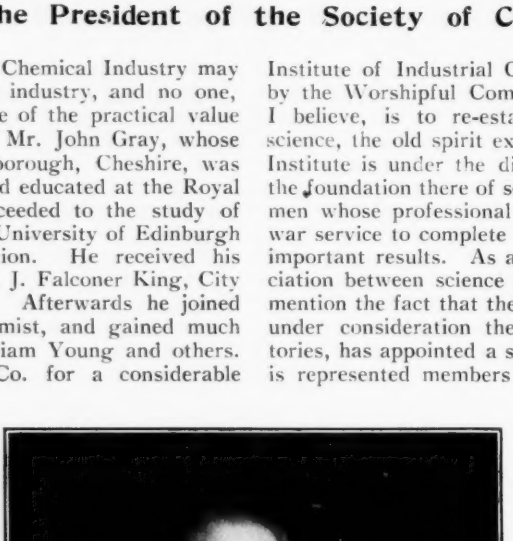
He did not think the nation was niggardly to patentees at all. He thought the Patent Bill had been an attempt to give a new charter to patentees. But the granting of a patent should help the trade of the country, not strangle it. We knew that during the last 30 or 40 years the patent law, worked mainly by people outside the country, had been used for keeping trade out of the country. No variations of the patent law would be approved of by the public that did not clearly assist the trade of the country.

The Chemist's Place in Industry

Interview with the President of the Society of Chemical Industry

THE new President of the Society of Chemical Industry may be said to have spent his life in the industry, and no one, therefore, is better qualified to judge of the practical value of the chemist's work in industry. Mr. John Gray, whose home is at Spital Old Hall, Bromborough, Cheshire, was born in the county of Midlothian, and educated at the Royal High School, Edinburgh. He proceeded to the study of chemistry and allied subjects at the University of Edinburgh and at the Herriott-Watt Institution. He received his practical training under the late Mr. J. Falconer King, City Analyst for the City of Edinburgh. Afterwards he joined the Clippens Oil Co., Ltd., as chemist, and gained much experience under the late Mr. William Young and others. He remained with the Clippens Co. for a considerable number of years, and rose from the position of junior chemist through progressive stages to the position of works manager. It was in the middle of 1898 that Mr. Gray joined the staff of Messrs. Lever Brothers, and he has since occupied various important positions. In 1902 he was appointed general works manager, he became a deputy-director in 1904, managing director in 1906, and vice-chairman of the Company on January 7, 1918.

Mr. Gray, who is a Fellow of the Institute of Chemistry, has been a member of the Society of Chemical Industry for about thirty-three years, and has served on the committees of the Glasgow, the East of Scotland, and the Liverpool Sections. He was Chairman of the Liverpool Section for two years, and Vice-Chairman for a similar period. He was elected a Vice-President of the Society in July, 1917. The important position Mr. Gray holds in connection with the great firm of Lever Brothers has given him a thorough knowledge of industrial organisation, and impressed him with the great value of scientific research and technical efficiency. His strenuous labours have left but little mark on him, and to his other qualifications for the Chair of the Society of Chemical Industry he brings the by no means negligible one of habitual cheerfulness and good humour.



Elliot & Fry.

MR. JOHN GRAY.

Science and Industry

It was natural, meeting Mr. Gray shortly after his election, that the conversation should turn on the work of the Society, to which he is so much devoted. "I believe," he said, "although the work accomplished during the last thirty years has been great, that we have still a long way to go. Our membership, gratifying though it be, should be much larger. In the first place, however, I think we ought to consolidate a great deal of the work we have in hand, whilst, of course, not overlooking the importance of progress and development. Then we should work for the much closer association of pure science and industry, though the tendency towards this has been very apparent for some years now. As an illustration, one welcomes the Salters' Institute of Industrial Chemistry, which has been founded by the Worshipful Company of Salters, and whose object, I believe, is to re-establish, as between commerce and science, the old spirit existing in the mediæval guilds. The Institute is under the direction of Dr. M. O. Forster, and the foundation there of scholarships, which will enable young men whose professional education has been interrupted by war service to complete their studies, is bound to have very important results. As a further example of the closer association between science teaching and the industries, I may mention the fact that the University of Liverpool, which has under consideration the extension of its chemical laboratories, has appointed a special advisory committee, on which is represented members of the larger industries in Lancashire and Cheshire, to help in the laying out and designing of the new buildings. Such a step on the part of the governing body of a University is, I think, unique, and shows a disposition on the part of those responsible for the teaching of Pure and Applied Science to obtain the co-operation and help of those who are actually engaged in the chemical industries."

The Nation's Need of Young Chemists

"What the country wants," Mr. Gray proceeded, "is a staff of young trained chemists—trained in the true sense of the word. In the past, many of the best brains of the country have been diverted from the chemical profession owing to the inadequacy of the remuneration which has been offered by manufacturers. This fault is being remedied, and the salaries now being paid to chemists are on a higher standard, and, no doubt, in the course of time, will be commensurate with the positions they occupy. We manufacturers must hold out sufficient inducement for young men to take up science as a profession. It cannot be expected that the best type of men will be tempted otherwise to accept such duties as their life's work. The prospect of high administrative positions in large companies should be open to the chemist who has proved himself capable of carrying out the important work of organised development and administration of chemical industries.

"I agree with Professor Louis that the future of this country depends very largely on the way the working man exercises the powers he now possesses. If we could only get the large majority of the working people to see the need—aye, the absolute necessity—of fuller production and what that means to themselves and the country generally, we need have no 'cold feet.' I believe myself that the time has come when all the patience and tact that we possess are required to get the working people educated to understand that fuller production is bound to be for their benefit. The principal trade union leaders with whom I have come in contact are perfectly aware of the necessity of this, but there is unfortunately a large number of the rank and file who

are imbued with the idea that the 'ca'canny policy'—and I regret to say it is a policy—is the only one to improve the conditions of the working classes. Education is the factor which will bring them to see the fallacy of their prejudice, so we must keep that factor steadily and persistently before us."

The Inter-Allied Movement

Mr. Gray is a keen supporter of the movement for an inter-Allied Federation of Chemistry, and was much interested, therefore, in the prominent position the subject occupied at this year's annual meeting. "I am," he said, "very much interested naturally in this development, because I have been associated with it for some years. You remark in THE CHEMICAL AGE that this is not organised merely as a punitive measure to exclude Germany, and a review of the facts will show how true that is. For example, at a meeting of makers of crude glycerine held in London on July 26, 1909, it was resolved to appoint a committee to go into the question of the standardisation of the analysis of crude glycerine, and I had the honour of acting as hon. secretary to the committee. An interesting development followed. It was recognised that this problem did not affect this country alone, and committees were formed not only for Great Britain, but for America, France, and Germany. These committees worked in the first instance independently, but were ultimately brought together, and, after a series of conferences, methods were agreed upon and adopted as the international standard methods for the analysis of crude glycerine. The British expert committee's report was published in 1911, so you will see this federal movement had begun long before there was any thought of war.

"The work done in this connection arose naturally out of the needs of the industry, and it illustrates very well the great advantage of scientific intercourse and co-ordination between the leading nations. Before the international standard methods were adopted there were constant cases of dispute, followed by troublesome and costly arbitration, for the simple reason that different analysts followed different methods, and the results were very variable and unsatisfactory. As the result of the adoption of international standards that disparity has been got rid of, and the result is that the old disputes and arbitrations have practically disappeared—a very good thing indeed. That was a piece of extremely useful work, and it illustrates very well, as I have said, the practical value of the chemists of different nations working in common instead of in isolation.

"There are many other problems in industrial chemistry which may be successfully tackled on the same lines, and I am hoping that when the Inter-Allied Federation gets to work, many important results will follow. There is, for example, the vital question of research work. This is essentially a matter in which all should co-operate with the idea of advancing the general standard of scientific knowledge, and research work here and in other countries will gain enormously by all engaged in it being brought into closer association and being kept informed of the latest developments. Co-operation is one of the essential factors in all movements to-day, and we want to make the fullest use of it in connection both with chemical science and chemical industry. So, as one of the early workers in this international movement, I am keenly interested in its development, and look forward to important results in due course.

"As to the annual meeting this year," the President added, "I think the conferences were remarkably successful. We had some very important and interesting papers, and the discussions were very suggestive and helpful. The Society has every reason to be well satisfied. I believe that the continued success of the Society and the increase of its membership and usefulness are closely bound up with the energy and progressive policy of the local Sections. It is extremely important that their activities should be encouraged. Every effort must be made to secure and hold the interest of the young man keen on advancing in his profession and on improving his position. It is my intention during the coming year to visit as many of the local Sections as I possibly can. I shall, in fact, try to visit all of them."

The Institute of Chemistry

Negotiations with the Minister of Labour

AT a Council Meeting held at the Institute on Friday, July 25, letters from Manchester, Liverpool and North-Western, Gretna, Glasgow and West of Scotland sections, enclosing copies of draft rules for local sections with amendments for the confirmation of the Council, were referred to General Purposes Committee.

The Royal Statistical Society wrote, asking the support of the Council to a petition to H.M. Government for a preliminary Committee to be set up to examine the whole question of the collection and presentation of public statistics. The President was asked to sign the petition on behalf of the Council.

Sir H. Frank Heath (Research Department) wrote stating that the researches undertaken by the Vitreous Compounds Research Committee have now been transferred to the British Scientific Instruments Association, and thanking the Institute for help in the matter.

The death of three fellows, one associate, and one student was reported.

The report of the Nominations and Examinations Committee (on meetings held on July 4, 11, 18 and 22) was received and adopted, including the admission of eighteen students, the election tion of fifty-seven associates, five associates to fellowship, seventeen fellows, and reports on other cases, including many candidates recommended for admission to the examination; pass lists of July examination; the election of candidates successful in the examination. The Committee were empowered to accept applications from candidates for an examination in biological chemistry to be held in October next.

Further applications has been made to the Minister of Labour to receive a few representatives for a brief conference on the problem of devising means whereby the importance of chemical science to industry may become better realised by both employers and employees, and the interests of chemists themselves may be safeguarded. Representatives of the Institute have since been received by Mr. Wardle, M.P., on behalf of Sir Robert Horne, and the matter is proceeding.

The Hartley University College, Southampton, and Sir John Cass Technical Institute, London, were added to the list of recognised institutions—the latter subject to certain conditions as to the extent of evening training. Further consideration was given to a letter from Mr. F. M. Potter, with regard to giving further publicity to the requirements of the Institute in physics and mathematics. These requirements will be further emphasised in the Regulations.

Sir William Tilden and Mr. A. Chaston Chapman were nominated, as representatives of the profession of chemistry, to serve on the Consultative Council on Medical and Allied Services, of the Ministry of Health.

Consideration was given to a number of suggestions with regard to the publications of the Institute. It was decided that the Proceedings be issued six times in 1920. Further consideration was given to a pamphlet to be produced in connection with the final appeal for the Building Fund.

Mr. F. J. Lloyd moved that a branch of agricultural chemistry and micro-biology be added to the branches of examination for the associateship. The Nominations and Examinations Committee has been requested to consider this suggestion when the Regulations are under revision.

Mr. Fred Mills, managing director of the Ebbw Vale Company, states that the directors of the company have set aside a sum of £20,000 for rebuilding and remodelling the literary and scientific institute at Ebbw Vale, which will be called the Memorial Institute, and will serve as a memorial to the 400 men killed from the district. The company are also offering two scholarships for competition by students of the Institute to entitle the winner to free travel to foreign countries for the purpose of studying the methods of industry. Mr. Mills also states that the Ebbw Vale Company are arranging for the manufacturing of aniline dyes.

Annual Report on British Alkali Works

II.

We give below the concluding portion of our summary of the Chief Inspector's Annual Report on Alkali Works in England and Wales, the first instalment of which was published last week:

Sulphuric Acid (Class II) Works

Contact Processes.

The three types of this class of works, as referred to in past reports, continued in use. Pyrites and sulphide ores of zinc were the sources of sulphur utilised. The latter was of more recent introduction to contact process work in this country, and proved satisfactory for acid making, whilst the calcined ore was suitable for the extraction of zinc.

The thorough purification of the impure acid gases derived from the burning of pyrites, so necessary for the maintenance of the activity of the contact material, was found to be most difficult of achievement in several cases. Despite the elaborate and costly plant provided for this purpose, much trouble, expense, and loss of time were incurred through inefficient conversion of SO_2 into SO_3, causing a high escape of acid gases along with a low production of "oleum." These purification arrangements are being remodelled and improved.

At one factory, owing to pressure for munition requirements, a section of the plant continued at work long after it was in need of repair, and caused much anxiety from undue escape of acid gases. When relief came from a less urgent demand this section was promptly laid off for attention.

Concentration Processes

There was a marked reduction in the number of exits tested —from 135 in 1917 to 99 in 1918—and a further reduction in the acidity of the gases discharged compared with 1917 and 1916. The aerial pollution from this class of works was therefore materially lessened. This was due in part to improvement in design and better maintenance of plant, in part to the diminished pressure upon the plants at work owing to the increased capacity of production of high-strength acid by other methods.

Gaillard towers continued in use, but to a more limited extent. This type of plant was still characterised by emitting the discharged waste gases higher in acidity than the others. The modified form of the Kessler concentrator did highly satisfactory work, whilst the ordinary Kessler and its allied forms maintained their standard of efficiency. The cascade systems continued in operation with varied efficiency in different works. The Davis concentrator was used for bringing chamber acid up to about Glover tower strength, and gave satisfaction. With this limited degree of concentration the evolution of acid gases is not so prominent a feature as is the case with production of concentrated acid of the highest strengths, and the means provided secured a low acidity in the gases finally discharged. The Calder-Fox scrubber referred to in the 54th Annual Report was further improved in the light of accumulated experience, and is an efficient remover of suspended liquid particles.

It still seems necessary to call attention to the dangers of working in tanks without proper ventilation, both prior to anyone entering and also throughout the period whilst anyone remains in them, and to the necessity for taking precautions against the existence or formation of arsenuretted hydrogen.

Chemical Manure Works

The number of registered works of this class was 142, an increase of four over 1917. This increase is notable as breaking the continuous gradual decrease in number of these works during the preceding eight years. There were also considerable alterations and improvements effected, which gave increased power of production. The means provided for preventing escape of noxious gases were maintained in satisfactory condition.

Much greater activity characterised this industry, and still greater production might have been achieved had available labour been more abundant. There was not the lack of sulphuric acid evident in the previous year, but the use of nitre cake referred to in the report for 1917 as a method of producing superphosphate in the absence of sulphuric acid was continued, and is likely to become a permanent process, as it has certain advantages apart from the question of producing supers during a period of limited acid supply.

The use of mechanical dens extended considerably, to the advantage of the industry and the improvement of conditions in the works. The number and variety of designs of the dens are now considerable; in addition to those which have been in operation for a number of years, many new examples continue to be introduced. Mr. Littlefield, in his report on District IVA, comments favourably on the Sturtevant plant, and Dr. Fryer, in his report on District VIA, describes the new "Hill and Eden" design, which differs from others in its general features. He states that there is a mixer in continuous operation discharging into a series of dens, and proceeds:—"The dens are four in number, being rectangular in form, 9 feet high by 5 feet square below and 4 feet 6 inches above, each holding 3 tons of superphosphate. When one is filled, the false bottom is wheeled away on a trolley and replaced by a screen of pianoforte wires, and pressure is then applied to the top of the den, and the mass of superphosphate passes through the wire screen into a hopper below."

The following table shows, in tons, the importation into the United Kingdom of some of the materials in greatest use for the manufacture of chemical manures:—

	1918.	1917.	1916.
Guano	Nil	2,601	21,644
Mineral phosphates	464,747	276,617	333,371
Nitrate of soda	300	1,680	20,896

Sulphate and Muriate of Ammonia and Gas Liquor Works

There was an increase of one in the total number of registered works in these two important groups. The total of 743 was composed of 632 sulphate of ammonia and 111 gas liquor works, as compared with 634 sulphate of ammonia and 108 gas liquor in 1917. The following table shows the amount of ammonia products manufactured in the United Kingdom (expressed in terms of sulphate 24½ per cent. NH_3)—tons:—

From Liquor produced in	1918.	1917.	1916.
Gas works	173,541	188,478	172,269
Iron works	12,717	13,621	15,154
Shale works	58,311	60,560	57,988
Coke oven works	164,448	166,354	159,506
Producer-gas and carbonising works (bone and coal) ..	23,534	29,604	28,786
Total	432,551	458,617	433,703

Of the above total quantity of ammonia products, the equivalent of 121,681 tons was manufactured as concentrated ammoniacal liquor; the balance of 310,870 tons consisted of other ammonia products (sulphate, chloride, nitrate, &c.).

The production and character of ammonia products continued to be influenced by war conditions. The total quantity produced was less than in 1917 by the equivalent of 26,066 tons of sulphate of ammonia; thus, the first and the last year of the war were both associated with a reduction in recovery of ammonia products, although in 1914 the reduction was only 6,206 tons. The shrinkage in 1918 was large when the expanding character of ammonia recovery for many years past is considered.

Many influences tended towards a reduced production. Amongst those affecting gas works may be mentioned the inferior quality of coal used in many works, the use of water gas, the large production of gas per ton of coal carbonised, the use of steam in vertical retorts, the production of concentrated ammoniacal liquor accompanied too frequently by a high working loss of ammonia, and a reduction in the quantity of gas consumed. It may be well to point out, as a similar passage in last year's report was not

fully apprehended by everyone, that a large production of gas per ton of coal carbonised and the use of steam in vertical retorts may lead to an increased recovery of ammonia per ton of coal; but if the weight of coal used per volume of gas distributed is more than correspondingly less, an increased recovery per ton of coal is associated, on a similar gas consumption, with a decrease in the actual quantity recovered. There was, further, a reduction in the ammonia products recovered in shale works and in producer-gas and carbonising works, as well as a moderate reduction in iron works.

From a recent report on mines and quarries for the year 1918 the following statistics have been extracted :—

There were 16,540 coke ovens in use, comprising :—7,013 of the beehive type, 2,217 of the Otto Hilgenstock design, 1,750 of the Simon Carvès design, 1,415 of the Coppee design, 1,361 of the Koppers design, 1,357 of the Semet Solvay design, 1,427 unnamed.

It is noteworthy that all these designs of named origin are of foreign creation, as also are some, at all events, of the residue of 1,427 not specially particularised. The number of ovens of the beehive type is still large, but in some cases local conditions—such, for instance, as the total quantity of local coal—may not justify the expenditure necessary for the erection of the more elaborate recovery plants. Prior to the war the erection of recovery coke oven plants seemed to have got under foreign, largely German, control. During the war important additions have been made to works of this class by British effort and British material, so that the future erection of such need not return under the former control.

Nitric Acid Works

The number of this class of works was 96, a decrease of five compared with 1917. There was further decreased activity in the works in operation as compared with the immediate past, so that there was a marked reduction in the production. This rendered more easy the attainment of conditions for satisfactory working, and condensation of the nitrous fumes developed were effected efficiently in all cases. In the great majority of works the nitric acid was still manufactured by the decomposition of nitrate of soda, but a material proportion was obtained from the oxides of nitrogen resulting from the oxidation of ammonia and from the use of nitric acid in various processes of chemical manufacture.

The utilisation of nitre-cake continued to receive attention, and latterly use was found for all that available.

Chlorine Works

The number of this class of registered works was 32, an increase of two over 1917. This increase was due to the registration of works in which chlorine, received in the liquid form, was used in chemical processes. The production of liquid chlorine was effected on a large scale. The liquefaction was carried on most efficiently with a minimum loss of this noxious gas.

The electrolytic methods for production of chlorine came into much more extended use during the year, and led to the stoppage of several units of the long-established Leblanc alkali process.

Muriatic Acid Work

The number of this class of registered works was 69, an increase of three over 1917. This increase was chiefly due to the production of muriatic acids in works using liquid chlorine for preparation of organic products by processes in which muriatic acid is formed as a secondary product.

The wool carbonising industry was active throughout the year. Carbonising machines of improved type were brought into more extended use.

The tinplate works were restricted in their operations by limited supplies both of labour and material. This limitation of output influenced the quantity of tinplate flux to be dealt with in the furnaces and lightened the work to be done by the means in use for preventing undue escape of muriatic acid. The figures given above indicate a reduction in the proportion of this gas which is allowed to escape from works of this class which are situated in Districts VI and VIA. There were, however, some cases in which improvement is still required. The use of nitre-cake for pickling the steel plates prior to tinning continued to be widely and successfully practised.

Sulphide Works

The number of this class of works registered was 98, a reduction of three from 1917. There was, especially towards the end of the year, a contraction in the purification of sulphuric acid from arsenic by means of sulphuretted hydrogen. The "Trepex" plant designed for this purpose came into more extended use in the course of the year.

One group of works included in this class consists of works in which certain dyes are made by the interaction of a metallic sulphide with suitable organic substances. In such operations much sulphuretted hydrogen may be involved. Similar dyes are made involving chemical action between sulphur and organic compounds, but in which no metallic sulphide is used. In such cases also much sulphuretted hydrogen may be evolved, but they do not come under the control of the Act.

Alkali Waste Works

The extent of operations in this class of works was greatly reduced. The production of alkali by electrolytic methods avoids the formation of alkali waste, so the further extension of these methods already referred to entailed a corresponding reduction in the quantity of waste available for treatment for recovery of sulphur. The number registered remained as in 1917, but the curtailment in operations will lead to fewer works of this class remaining in operation in the future.

Arsenic Works

The number of this class of works registered was 52, an increase of seven over 1917. The attractive prices for white arsenic led to the starting of several new works, which might have been still more numerous had labour and material been more readily at command. Dr. Fryer, in his report on District VI, gives numerous results of his testings to note the efficiency of the condensing plants in these works and the character of the gases discharged from them.

As in previous years, dry filters proved more efficient than wash towers for arresting arsenious acid, although with both types the final escape was satisfactory.

Bisulphide of Carbon Works

The number of this small class of registered work was five, the same as in 1917. There was active manufacture, and the steps taken to prevent aerial pollution were increased in efficiency. At one work a Claus plant was erected to deal with the sulphuretted hydrogen formed; at another the whole plant was remodelled and improved, oxide purifiers of improved design being provided; and at a third work improved working was effected by better drying of the charcoal used and more thorough condensation of the volatile products.

Picric Acid Works

The number of registered works of this class fell from 21 in 1917 to 15 in 1918. In those works continuing upon the register a great fall-off in operations followed the completion of the Armistice. In the earlier part of the year recovery towers were brought into more extended use for recovery of nitric acid, which reduced the proportion of noxious gases discharged. Improved methods of manufacture were developed and brought into successful operation, but with the cessation of war conditions the future requirements of picric acid will be small.

Tar Works

The number of registered works of this class was 375, an increase of fifteen over 1917. Owing to difficulties of transport and labour the stocks of pitch were unduly heavy in some localities, whilst in others there was an active demand. The erection of tar dehydrating plants in gas works continued to extend, whilst plants for the full distillation of tar also increased in number. The operations carried on in these works throughout the United Kingdom are shown below :—

	Tons.
Tar distilled in—	
Gas and coke oven works	1,510,065
Other works	131,325
Pitch produced in—	
Gas and coke oven works	720,527
Other works	71,237

Alkali Works in Scotland

In the section of the report on Scotland it is stated the number of works registered was 166, a decrease of two from 1917. In many of these works more than one registered process was in operation. The number of these processes was 321, an increase of four over 1917. Of these 321 processes, 6 were alkali (salt-cake), 2 alkali (wet copper process), 3 smelting, 19 sulphuric acid, 19 sulphuric acid (Class II), 30 chemical manure, 13 gas

liquor, 8 nitric acid, 109 sulphate and muriate of ammonia, 2 chlorine, 4 muriatic acid, 15 sulphide, 2 alkali waste, 13 lead deposit, 2 arsenic, 7 nitrate and chloride of iron, 1 bisulphide of carbon, 1 picric acid, 5 paraffin oil, 8 bisulphite, 50 tar, and 2 zinc extraction.

Through the courtesy of manufacturers in supplying the requisite information, the following statistics regarding quantities of raw materials used, or products obtained, have been compiled:

		1918. Tons.	1917. Tons.
Pyrites burned		131,372	146,030
Mineral prosphates and bones dissolved		76,800	64,150
Ammonia products (expressed as sulphate)—			
Gas works	21,771		
Iron works	11,861		
Shale works	58,311		
Bone, producer-gas, coke and carbonising works	18,579		
		110,522	118,427

Of the above total quantity of ammonia products, the equivalent of 24,727 tons of sulphate were manufactured as concentrated ammoniacal liquor; the balance comprised other ammonia products (sulphate, chloride, nitrate, &c.).

		1918. Tons.	1917. Tons.
Tar distilled—			
Gas and coke oven works ...	142,222		
Other works	120,549		
		262,771	262,158
Pitch produced—			
Gas and coke oven works ...	67,110		
Other works	66,790		
		133,900	137,012

'Alkali Works

The registered works of this class remained unchanged in number or condition. The use of mechanical furnaces continued to give satisfaction, alike as regards costs and as regards the maintenance of minimum escapes of acid gases at the furnaces. As in the majority of these works the operations do not proceed beyond the production of salt-cake and hydrochloric acid, there is not the same opportunity of introducing electrolytic methods which produce in a direct way caustic alkali and chlorine. Attention continued to be given to the alkali waste heap, which in the recent past gave cause for special consideration, and improved conditions were maintained during the year.

Smelting Works

Operations were restricted owing to scarcity of the requisite raw materials, so that the total volume of chimney gases discharged was smaller. Very slow progress was made with the erection of plant, referred to in the report for 1917, for the manufacture of sulphuric acid from the acid gases developed during the calcination of zinc sulphide ores, and it was not completed at the end of the year.

Sulphuric Acid Works

The pressure upon this class of works for maximum output was lessened, and permitted of greater opportunity for repair and reconstruction of plant, of which advantage was taken to effect extensive improvement. In one work the trial of a combination of an intensive working section and an ordinary chamber section did not give the improved results looked for. One of the units of the sulphuric acid plant at a registered works was provided with an oxide of iron contact tower placed between the burners and the Glover tower. This was brought into operation in the course of the year, and was accompanied with a reduction by one-third of the nitre required to work the process. This is, so far, a satisfactory feature, and the further experience from continued working of this unit will be watched with interest.

The system referred to in the report for 1917 of a more complete observation of the chamber process by testing the gases at successive stages had to be relinquished in part, owing to unusual and excessive demands upon the chemical staff from other departments in the work in question. It is hoped, however, that this subject will again be taken up and applied even more fully than had previously been the case.

Chemical Manure Works

The number of registered works of this class was thirty, a reduction of one from 1917. Although the number of works was less, the production of chemical manure was much greater, and materially exceeded that for 1917, which was quite up to the pre-war figure. Indeed, the quantity of 76,800 tons of phosphates and bones dissolved for this manufacture is the largest on record for Scotland. A further increase in the use of mechanical dens was made, a development to be welcomed, improving as they do alike the conditions inside the works with capacity for production. The treatment of the noxious gases evolved continued to be satisfactory, save, temporarily in one works, where, owing to failure of certain luted connections, an escape of noxious gases occurred. The fault was quickly remedied and the normal satisfactory conditions reinstated.

Nitric Acid Works

These works continued in active operation for the greater part of the year, but the altered position in November, as regards munition requirements, materially lessened the demand for nitric acid. In one works the oxidation of ammonia to oxides of nitrogen by a catalytic method was successfully applied to the manufacture of nitrates, but the altered position at the end of the year led to the stoppage of these operations. In this case, as in the others, the prevention of atmospheric pollution was adequately and satisfactorily effected.

American Method of Growing Crystals

Mr. R. W. Moore, an American physicist, has discovered (the *Times* states) a new method of growing crystals which he thinks may be of general application. It has long been known that if crystals be suspended in a saturated solution of the chemical substance of which they are composed they will increase in size. The crystals formed in this way are usually irregular, but by the new method it is claimed that they will grow to almost any size and remain clear and perfect. The experimenter has grown crystals of Rochelle salt (sodium potassium tartrate) more than 3 in. long and 2 in. thick, with all the surfaces and angles perfect. The salt in question is more soluble in hot water than in cold water. A super-saturated solution is made by allowing a saturated solution to cool slightly, and seed crystals are suspended in this. The temperature is carefully regulated by a thermostat, so that the condition of slight super-saturation is maintained. So long as this lasts the crystal continues to increase in size. It would be an interesting development were it found possible to apply this principle to the artificial production of diamonds. Recent investigations have shown that a larger proportion of diamond can be produced artificially in a given weight of iron and carbon than occurs naturally in the blue clay of the Kimberley mines. The fragments, however, are of microscopic size, and have no commercial value. It has also been shown that sudden cooling and enormous pressure are not factors in the crystallising of carbon from its solution in iron.

Mr. E. C. Powell, managing director of the Bow Bridge Dyes and Chemical Works, Stratford, writes to the *Times*:— "The discovery claimed by Mr. R. W. Moore, an American physicist, is interesting; but the suggestion that this method permits of the growth of crystals of greater size than otherwise obtainable is open to question. In the course of experiments, which resulted in our producing, on a scale previously unobtainable, sodium permanganate of the requisite standard for the Chemical Warfare section of the Ministry of Munitions during the war, Mr. D. L. Couch, a member of our technical staff, produced crystals of potassium permanganate up to 6 in. in length, and the method employed clearly indicated that the limits of possibility in size while maintaining a full standard of purity, were by no means reached. The demand on our energies at the time was too great to allow of the subject being pursued in this direction, but we think we are justified in claiming that in this, as in other instances, British scientific skill is in no way behind that of other countries

A Swedish Royal Decree (No. 264), dated June 4, exempts as from June 5, a number of articles from the operation of the Swedish export prohibitions. The following are among the articles in respect of which the export restrictions are now withdrawn: Iron plates and sheets, coated with tin, lead, etc., certain chemical scientific instruments, mounted optical glasses, barometers, thermometers, manometers, vacuum gauges, analysts' and chemists' scales, etc.

British Import Restrictions

[From The *Board of Trade Journal*, July 31, 1919.]

We publish below from the supplement to the Board of Trade Journal of July 31, 1919, extracts relating to the chemical and allied trades from the Consolidated List of Import Restrictions revised up to date.

Part I.

Alphabetical List of Goods Which May Be Imported Without Licence.

Goods marked with an asterisk (*) are those which have been removed from the Prohibited List by means of General Licences issued to the Customs. The other articles are not covered by the Prohibition of Import Proclamations. These goods may now be imported without licence from Germany and German-Austria. *All* articles, except hops, which are produced in and exported from any part of His Majesty's Dominions may be imported without licence.

*Abrasives :—
  Carborundum.
  Chromatum powder.
  Silicon carbide.
  Aloxite.
  Chalk flint combination.
  Crystolon.
  Emerite.
*Acetic acid, all kinds.
*Aloxite hones.
*Aluminium powder.
* ,, sheets, foil, circles, rods, bars, ingots, angles, wire, tube, and strip.
*Antimony, crude regulus, and sulphide.
*Antimony ore.
*Antimony ware.
Asbestos, raw.
Blacking and polishes.
Bones.
*Bronze powder.
*Burners, gas and oil lamp.
Candles.
*Castings bronze (machine or phosphor bronze).
*Cells, Edison and component parts, for electrically propelled vehicles.
*Celluloid in sheets, rolls, and rods.
Chemicals :—
  *Acetate of iron.
  *Acetate of lime.
  *Acetic acid.
  *Acetone.
  *Adalin.
  *Alum.
  *Aluminium acetate.
  *Aluminium sulphate.
  *Ammonia (hydrate).
  *Ammonia carbonate.
  *Ammonia chloride (Muriate).
  *Ammonia chlorate.
  *Ammonia nitrate.
  *Ammonia phosphate.
  *Ammonia sulphate.
  *Baryta.
  *Bleaching powder.
  *Boracite.
  *Borate of lime.
  *Borate of manganese.
  *Borax.
  *Boric acid.
  *Brimstone.
  *Calcium carbide.
  *Carbon bisulphide.
  *Carbonic acid.
  *Chloroform.
  *Chromic acid.
  *Cinchonic salts.
  *Citrate of lime.
  *Citric acid.
  *Copper sulphate.
  *Cream of tartar.
  *Epsom salts (Kieserit).
  *Ether.
Chemicals—*continued.*
  *Ferrous sulphate (sulphate of iron).
  *Formaldehyde.
  *Fusel oil.
  *Gelatine photographic.
  *Glycerine.
  *Hydrochloric acid.
  *Hydrofluoric acid.
  *Iodine.
  *Lactic acid.
  *Lead acetate (sugar of).
  *Lead nitrate.
  *Lithia carbonate.
  *Magnesia.
  *Magnesium chloride.
  *Magnesium sulphate.
  *Manganese dioxide.
  *Menthol crystals.
  *Mercurial salts.
  *Methyl ethyl Ketone.
  *Nitric acid.
  *Nickel oxide.
  *Oxalic acid.
  *Phosphoric acid.
  *Picric acid.
  *Quinidine salts.
  *Quinine salts other than sulphate.
  *Quinoidine.
  *Sal acetos.
  *Soda ash.
  *Soda aluminate.
  * ,, bicarbonate.
  * ,, caustic.
  * ,, chloride.
  * ,, crystals.
  * ,, nitrate.
  * ,, nitrite.
  * ,, silicate.
  * ,, sulphate.
  * ,, sulphide.
  *Stovaine.
  *Sulphuric acid.
  *Tartar emetic.
  *Tartaric acid.
*Dentists' accessories of all kinds.
*Diatomite, or infusorial earth.
Glucose.
Glue, size, and gelatine.
Glue stock, and pieces for making glue.
*Gold ores, auriferous copper ores and sweepings and residues containing gold.
Gum arabic.
* ,, copal.
* ,, kauri.
  ,, lac-dye, seedlac, shellac, and sticklac.
  ,, unenumerated.
*Gummite and manufactures thereof.
Gutta percha.
*Magnesite.
Manures of all kinds.
Margarine.
Metals and ores and manufactures thereof :—
  Ores :—
    *Antimony.
    Other sorts, except gold.
Mica.
*Nickel oxide.
Oil :—
  Fish, viz., train, blubber, sperm, or head matter.
  Animal.
  Coco-nut :—
    Unrefined.
    Refined.
  Mineral jelly (including vaseline).
  *Olive.
  Palm.
  Lubricating oils.
  Turpentine.
  Essential (if not capable of retail sale as perfumery).
  Unenumerated.
Oil-seed cake.
Oleo margarine or oleo oil
*Oleo stearine.
Painters' colours and pigments :—
  *Asphaltum.
  *Bitumen for black varnish.
  *Bone pitch.
  *Brunswick Black.
  *Burnt sienna.
  *Bone black.
  *Carbon black.
  *Carmine.
  *China ink.
  *Chinese ink.
  *Cinnebar native.
  *Cobalt oxide.
  *Earth colours.
  *Earth sienna.
Painters' colours and pigments—*continued.*
  *Gamboge.
  *Gamboge gum.
  *Indian ink.
  *Imitation goldleaf.
  *Lime green.
  *Ochre.
  *Orpiment.
  *Red oxide of iron.
  *Umber.
  *Zaffre.
*Paints and enamels.
Paraffin wax.
Pitch (other than coal pitch).
Rosin.
Rubber, raw.
* ,, scrap or waste.
Silica sand.
Talc, French chalk, steatite mineral white, silica, and soapstone.
*Tallow.
Tanning extracts :—
  *Chestnut.
  *Hemlock.
  *Mangrove.
  *Oak.
  *Quebracho.
  Tanning substances :—
    Bark for tanning.
    Gambier.
    Myrabolans.
    Sumach.
    Valonia.
    Unenumerated.
Tar.
Varnish (not containing spirit).
Wax (including ozokerit and earth wax).
*Yeast.

Part II.

Alphabetical List of Goods Which May Not Be Imported Without Licence From Places outside The British Empire.

Licences issued for goods shown in this list are not available for goods of German or German-Austrian origin, unless the contrary is expressly stated therein. * Where no ration is stated, the goods will be licensed *only exceptionally*, as and when required.

Article.	Extent to which Licences will be issued.*
Aluminium, hollow-ware, and other articles, except aluminium sheet, foil, circles, rods, bars, ingots, angles, wire, tubes, and strip, and aluminium powder	
Barrels or drums, steel, for containing oil or chemicals.	
Barytes.	Licensed freely on application.
Bone, manufacture of	100 per cent. of 1913 imports.
Carbons for arc lamps, cinemas, and searchlights.	20 per cent. of 1916 imports.
Chemicals of all descriptions, except those shown in Part I.	
Gas mantles, rings and supports (earthenware).	100 per cent. of 1916 imports in quarterly amounts.
Glassware, the following :— Scientific, machinery, optical, miners' lamp glasses.	
Glassware, other sorts (including bottles and jars).	50 per cent. of 1913 imports.
Lithopone.	Licensed freely on application
Magnetos.	
Methyl alcohol.	

Article.	Extent to which Licences will be issued.*
Motor spirit (including aviation spirit), kerosene (including white spirit), gas oil, fuel oil and distillates from which any of the preceding can be produced.	
Oil cloth, except table baize, blind cloth, and leather cloth.	Licensed freely on application.
Painters' colours and pigments, the following: Brilliant, bronze-blue, chrome-green, and yellow, chromate of lead, copper oxide, minium, oxide of tin, steel-blue, Parisian blue, powder colours, red lead, vermilion.	Ration 50 per cent. of 1916 imports.
Painters' colours and pigments, the following: Litharge, ultramarine blue, white lead, satin-white, lamp-black.	
Perfumery and toilet preparations.	
Potash salts.	
Red prussiate of potash.	
Rubber bands for stationery articles.	75 per cent. of 1916 imports in proportionate quarterly amounts.
Rubber, reclaimed.	
Saccharin.	
Spirits, raw, for industrial purposes.	
Tungsten powder and ferro-tungsten.	
Tyres, rubber.	50 per cent. of 1913 imports.
Zinc oxide.	50 per cent. of 1913 imports.

GOODS OF FRENCH ORIGIN.

Licences for goods of French Origin should, as hitherto, be obtained by the French exporter from the Paris Branch of the Department of Import Restrictions, Hôtel Astoria, Avenue des Champs-Elysées, Paris. Licences should be obtained before the despatch of the goods from France. Exceptions to this rule include potash salts, optical and laboratory glass, and spirits not covered by general licence. Applications for licences for these goods should be made to 22, Carlisle Place, S.W.1. Applications for licences for coal-tar dyestuffs and intermediates should be made to the Departments named in the Appendix.

Appendix

PROHIBITED ARTICLES WHICH ARE NOT DEALT WITH BY THE DEPARTMENT OF IMPORT RESTRICTIONS.

Prohibited articles in respect of which application should be made *not* to the Department of Import Restrictions, but to the authority shown against each.

All derivatives of coal tar generally known as intermediate products capable of being used or adapted for use as dyestuffs, or of being modified or further manufactured into dyestuffs. All direct cotton colours, all union colours, all acid wool colours, chrome and mordant colours, all alizarine colours, all basic colours, all sulphide colours, all vat colours (including synthetic indigo), all oil, spirit, and wax colours, all lake colours, and any other synthetic colours, dyes, stains, colour acids, colour bases, colour lakes, leuco acids, leuco bases, whether in paste, powder, solution or any other form.	The Secretary, Licensing Sub-Committee, Dyes Department, Board of Trade, Danlee Buildings, 53, Spring Gardens, Manchester.
Cocaine and opium.	The Under-Secretary of State, Home Office, Whitehall, S.W. 1.
Sugar.	The Royal Commission on the Sugar Supply, 14, Great Smith Street, London, S.W. 1.

Chemical Trade Enquiries

(From the "Board of Trade Journal" of August 7.)

CHEMICALS, COLOURS AND OILS.—An agent in Mulhouse desires to obtain agencies, for France, for United Kingdom manufacturing exporters of chemicals, aniline colours and aniline oil. (Reference No. 289.) Replies should be addressed to the Department of Overseas Trade.

CHEMICALS AND FOODSTUFFS.—A firm in Bâle wishes to secure agencies, for Switzerland and Alsace, for United Kingdom manufacturers of chemicals and foodstuffs. A speciality is made of effective advertising. (Reference No. 299.) Replies should be addressed to the Department of Overseas Trade.

CHEMICALS, DRUGS, &c.—A Japanese export house, with offices in London, desires to communicate with suppliers of chemicals, drugs, glue and gelatine, dyes and dyestuffs, paper and pulp, guns and explosives, rubber, asbestos, iron and steel manufactures, tin plates, tool steel, &c. (Reference No. 302.) Replies should be addressed to the Department of Overseas Trade.

CHEMICAL PRODUCTS AND FOODSTUFFS.—A French merchant in Madrid desires to secure agencies for British manufactures of chemical products, foodstuffs, and all articles comprised in these manufactures. (Reference No. 351.)

CHEMICAL PRODUCTS, METALS, COAL.—A firm in Madrid desires to secure agencies for United Kingdom manufactures of chemical products, iron, steel and tinplate. The firm also desire to secure an agency for a United Kingdom exporter of coal. (Reference No. 352.)

CHEMICALS, RUBBER GOODS, &c.—An agent in Warsaw, who has a sound knowledge of the trade of Poland, and can speak and write English, wishes to get into touch with United Kingdom manufacturers of chemicals and rubber goods, who are desirous of appointing an agent for Poland. These lines, it is stated, have been extensively imported into the Polish market from Austria and Germany, and find a ready sale in Warsaw, which is a distributing centre.

CHEMICALS.—A commission agent in Milan desires to represent United Kingdom manufacturers of electrical material, chemicals, and textiles, on a commission basis. Correspondence may be in French or English.

MINING CHEMICALS, RUBBER GOODS, DYES, &c.—A chemist and manufacturers' agent in Johannesburg desires to get into touch with United Kingdom manufacturers of mining chemicals, rubber goods, dyes, celluloid goods, bottles (chemists' and ordinary), paints, brushes, &c., with a view to obtaining agencies in South Africa. The applicant is at present in the United Kingdom, and is open to interviews.

Exports to Poland

THE Board of Trade announce that the Supreme Economic Council in Paris have decided to withdraw the Relief Mission in September, and that in consequence the British Relief Administration will not now be remaining in Danzic for any length of time. In these circumstances it is advisable that traders should proceed without delay to make their own arrangements for the forwarding of goods to Poland, although for the time being they may continue to consign them to the Relief Administration. They are, however, no longer required to do so.

Trade Opportunities in Germany

THE British Chamber of Commerce in Germany, which has been established at 133, Hohestrasse, Cologne, has been formally recognised as the British Chamber of Commerce in Germany, and is now affiliated with the Associated Chambers of Commerce of the United Kingdom. The aim of this Association, which already includes among its members firms with an aggregate capital of £250,000,000, giving employment to 1,745,000 workpeople, is to give advice and assistance to British subjects, newcomers to occupied Germany, and to voice the needs of British merchants, heavily handicapped as they are in comparison with their French and Belgian friends. The Chamber will be pleased to introduce British firms desiring representation in Germany to reputable agents, either British or German, and to refer prospective German buyers to English manufacturers and merchants. Trade literature, catalogues, &c., are required in order to assist local buyers to place their orders with British firms. These will be displayed in a reading-room, which is to be opened shortly. The Chamber draws attention to the favourable opportunities now existing for British firms to secure a firm and permanent footing in the German markets.

Chemical Matters in Parliament

Importation of Glass Bottles

MR. ARCHDALE (July 31, House of Commons) asked the President of the Board of Trade whether, in view of the fact that the present authorised proportion of 50 per cent. of the 1913 importation of glass bottles is now entirely inadequate in consequence of the inability of British manufacturers to supply the quantity required through shortage of coal and other reasons, it is now feasible to withdraw all restrictions in the importation of foreign bottles, and thus prevent serious loss of business to many traders whose main business is in bottled goods?

Mr. Bridgeman: This matter is now under consideration.

Importation of Chemicals

Mr. Cautley (July 31, House of Commons), asked the President of the Board of Trade whether a Committee representing the chemical industry has been appointed to advise the Board of Trade on the question of prohibition of the importation of chemicals; when such Committee was appointed and by whom; will he give the names of the members of this Committee; and whether the Proclamation issued on June 25 prohibiting the importation of chemicals of all kinds was issued under the Defence of the Realm Act?

Mr. Bridgeman: The Committee was appointed by the Board of Trade to advise the Department of Import Restrictions as to the issue of licences for the importation of chemicals, and held its first meeting on July 7. In addition to official representatives of the Board of Trade and the Ministry of Health, the following are members of the Committee:—Mr. T. D. Morson and Mr. R. H. Bewick, of the Association of British Chemical Manufacturers; Mr. W. F. Reid, of the Society of Chemical Industry; Mr. E. White, of the Pharmaceutical Society; Mr. T. E. Lescher, of the Drug Club, and Mr. W. Mann, of the British Chemical Trades Association. The Proclamation, like other Prohibition of Import Proclamations, was issued under Section 43 of the Customs Consolidation Act.

Petrol Prices in London and New York

Lieut.-Colonel Spender-Clay (July 31, House of Commons) asked the President of the Board of Trade whether his attention had been called to the comparative price of petrol in London and New York; whether the wholesale price in London is 2s. 8d. and 2s. 6d. per gallon for No. 1 and No. 3, as compared to a price of 1s. 4d. per gallon in New York; whether his attention had been drawn to the recent rise in value of oil shares; whether there is evidence of profiteering in an essential commodity; and what action he proposes to take in the matter?

Mr. Bridgeman: In comparing the prices of petrol in London and New York, it must be borne in mind that the London price includes 6d. import duty, freight, and costs of handling in this country. On the information before me I am not prepared to say that the margin of profit is excessive.

Feeding Stuffs

Lieut.-Colonel Murrough Wilson (August 1, House of Commons) asked the Food Controller whether the prices of linseed cake, cotton cake, and other feeding-stuffs are to be controlled; and, if so, from what date?

Mr. McCurdy: Arrangements have been made with the manufacturers of home-produced cakes and meals for these commodities to be available to farmers at the following prices ex mill:—Linseed cake, £25 a ton; cotton-seed cake, £20 a ton; with other cakes and meals on a parity.

Peat and Oil in Ireland

Sir Maurice Dockrell (August 1, House of Commons) asked the Chief Secretary for Ireland if he is aware that one-seventh of the surface of Ireland is covered with peat; what are his latest advices from his experts as to utilising this great national asset either in conjunction with or in substitution for coal; and has he reason to believe that oil in paying quantity exists in Ireland?

Mr. Macpherson: The Irish Peat Inquiry Committee appointed by the Fuel Research Board, to inquire into the problem, have presented their Report, which is now under consideration by the Government. There is no evidence as to existence in Ireland of natural oil in paying quantity.

Royalties on Derbyshire Oil

Mr. Holmes (August 5, House of Commons) asked the Prime Minister whether the Government have come to a decision concerning the payment of royalties on the oil discovered in Derbyshire?

Mr. Hope: I regret that I am not yet in a position to announce the decision of the Government on this question.

The Cellulose Inquiry

Mr. Raper (August 5, House of Commons) asked the Prime Minister when Lord Sumner's Report on the cellulose inquiry will be forthcoming?

Mr. Bonar Law: It is hoped that the Report will be in the hands of my right hon. Friend the Chancellor of the Exchequer in the course of a few days.

Mr. Raper: Is it not a fact that it was stated in this House by the Prime Minister, in reply to a similar question a few weeks ago, that the Report would be forthcoming before the end of last month, and may I take it the Report will be forthcoming before the House adjourns?

Mr. Bonar Law: I think that is certain.

Mr. Lambert: Will the Report be in the hands of Members as well as the Chancellor of the Exchequer?

Mr. Bonar Law: Oh, yes.

Chemists' Salaries

Mr. Sitch (August 5, House of Commons) asked the Parliamentary Secretary to the Ministry of Munitions whether he is aware that a request was made to the Department to sanction an increase of salary to the chemists employed in His Majesty's factory, Oldbury; whether this request was refused; and, if so, will he state the reason?

Mr. J. Hope: I am informed that the request was refused on the ground that the chemists employed at His Majesty's factory, Oldbury, were at least as well paid as chemists employed at other Government factories, and that it was impossible to consider the case of a single factory apart from the general question of the salaries paid to all chemists and other technical officers in the employment of the Government.

Mr. R. Young asked the Parliamentary Secretary to the Ministry of Munitions whether he is aware that amongst the chemists employed in explosive factories who signed the memorial praying for a revision of salary there were at least 100 associates and fellows of the Institute of Chemistry; whether the work done by these chemists in developing and maintaining the output of some of the most indispensable munitions of war has been recognised; whether he is aware that the memorialists were informed that the question of principle raised in the memorial could not be admitted by the Ministry, that the salary of the chemists could not be compared with the earnings of tradesmen, and that the Ministry objected to meetings being held by any section of the staff of factories under their control to pass resolutions asking for a revision of salaries and appointing deputations to wait upon the superintendent in respect thereof; whether this statement was made with his sanction; and, if so, will he state the reason?

Mr. Hope: I see no reason to doubt the suggestion in the first part of the question. I fully recognise the admirable work done by chemists in developing and maintaining the output of munitions. The statement mentioned in the third and fourth parts of the question were made by an officer of the Department, but must not be taken to express the considered view of the Ministry. I hope to make a more complete statement on this subject on Thursday in answer to the hon. Member's question.

Beet Sugar Factory.

In reply to Sir J. D. Rees, who asked whether any, and, if so what assistance is being given by the Government to the establishment of a beet sugar factory at Kelham, Sir Arthur Boscawen (Parliamentary Secretary to the Board of Agriculture) said the Government have decided in principle to give assistance to the British Sugar Beet Growers' Society for the purpose mentioned by means of an advance of part of the capital required, and a guarantee of interest for a certain number of years on the remainder of the capital, up to a fixed amount. The exact terms and conditions of the assistance to be given are now under consideration.

A Bill to suspend temporarily the duties of 10, 50 and 20 francs per 100 kilogrammes on raw and refined sugars respectively, imported from abroad, having been introduced in the French Chamber, the retail price of sugar will be reduced by 20 centimes per kilogramme (about 1d. a pound).

Chemical and Metallurgical Corporation

Patents Acquired by the Company

At the statutory meeting of the Chemical and Metallurgical Corporation, Ltd., held on Thursday week, the chairman (Mr. Herbert Guedalla) said that the Corporation had acquired for the sum of £25,000 in cash and the amount of £1,000,000 paid in ordinary shares the world rights of Mr. Frank Elmore's patented invention for the separation by an economical and efficient chemical process of the lead and zinc contents of zinc, lead ores, and concentrates. This invention, he said, has been favourably reported on by experts who are second to none in their knowledge of this particular business, and certain of your directors are eminently qualified to judge as to the effect of the process. Mr. Elmore is always working for improvement, and he has lately discovered a method which will enable him to deal with other metals successfully. In conjunction with other parties, we are now arranging to establish a plant in this country for the purpose of the actual treatment of middlings and concentrates, and whilst we have arranged a contract for the supply of middlings from Australia which, according to our managing director, should prove to be very profitable, we are also in negotiation for a constant supply of the requisite raw material to keep the new works going on a proper commercial basis. You will appreciate that it must take some little time before these works are in active operation, but I have no doubt that when completed they will produce an important revenue for many years.

Foreign Rights

As regards the foreign situation of the patents, we may roughly at present divide the geographical position into seven parts. In the first place, the Burma Corporation have an option to call for a licence in Burma and India on certain terms. This option extends to May, 1920, but as we are only too anxious that the Burma Corporation should utilise this process, we are willing to give them every opportunity for coming to a decision as to the ultimate treatment to be adopted at their mines. The option with regard to the United States of America and Canada has been exercised, and this calls for the formation of a company with a capital of £400,000, of which your Corporation will receive £200,000 in fully-paid shares. The option with regard to Mexico and Central America has also been exercised, and your Corporation will receive 115,000 fully-paid shares in a company with a nominal capital of £200,000. Another group have exercised the option with regard to Russia, Norway, and Sweden, and in this case your company will receive £150,000 fully-paid shares in a company with a capital of £300,000, but it is possible that we may agree to a certain part of this capital being put up in the form of preference shares. We are completing an agreement for the establishment of a trial plant to demonstrate the process in Australia in connection with the chief mining companies there, and an agreement is almost completed with most important mining interests in France for the acquisition of the patents for France, North Africa, Spain, Portugal, &c. The option with regard to Southern Africa has not yet been exercised.

With regard to these agreements, your directors have every hope that by the time the first general meeting of the company arrives the balance-sheet will contain a very substantial asset in the shape of shares in these various subsidiary undertakings. There has been a slight delay, owing to certain recent improvements, in supplying the specifications of the plant to all these concerns, but I trust that these plans will be in their hands within the next few weeks. Although, naturally, it takes some little time to start a business of this character, I think I can say that we have every reason to be satisfied with the progress already made.

The Cementation Process

There is one other matter to which I should refer. When this Corporation was formed, Mr. Elmore also transferred the benefit of an option which he had secured with regard to the well-known cementation process invented by Mr. François. We have had full reports on this process, and, in addition, we have the practical fact that Mr. François has carried out numerous contracts successfully in shaft-sinking through water-logged strata. By this process the water is practically sealed off, and it is not necessary to refer to the great utility of such an invention and the large demand in all parts of the world for the use of this process. Your Corporation has the right to form a company to deal with this matter, and we are in active negotiation with Mr. François as to the best method of financing the various contracts. You will note in the report that there is an advance of £8,105 in connection with this scheme. From the reports to hand, I have no doubt but that our interest in this process will prove a most profitable adjunct to our business. I need not detain you longer on this occasion, but I shall be very happy to answer any questions arising out of the report.

No questions having been asked, Mr. Francis Moore proposed a vote of thanks to the chairman and directors for the energetic way in which they had conducted the affairs of the company. He considered that what had been done in the short time which had elapsed since the formation of the Company was splendid.

Mr. Henry Richards seconded the motion, which was carried unanimously.

Sugar and Malt Products

Amalgamation with Manbré Saccharine Co.

At an extraordinary general meeting of the ordinary and deferred shareholders of Sugar and Malt Products (Ltd.), held last week, for the purpose of considering proposals to wind up voluntarily the company and to register a new company under the title of Manbré Sugar & Malt (Ltd.),

The chairman, Mr. A. Boake, said that the proposed scheme was one to unite the business of Sugar & Malt Products (Ltd.) with that of the Manbré Saccharine Co., and it was the Board's unanimous opinion that the fusion was one on which they could all congratulate themselves. The name of "Manbré" had been before the public for over 40 years, and during that time the Manbré Saccharine Co. had had a high reputation for the quality of their sugars and other products. That goodwill was in itself an asset of considerable value, and under the new management they hoped and expected to add to it considerably.

Before going far into the negotiations, the directors conducted a very careful investigation as to the conditions of the Manbré works at Hammersmith, and he could speak in the highest terms of those buildings, the way in which their construction had been thought out, and the machinery erected to effect the purpose for which it was intended. The handling of their fuel and general steam-raising plant was in a very efficient condition and was arranged to work on the most economical basis. Mechanical appliances were so situated as to enable manufacturing operations to be conducted with a minimum of labour, which under present conditions was of supreme advantage. The fresh capital recently issued by Sugar & Malt Products (Ltd.), in order to provide better building accommodation, and for the extension of the refining plant would go to assist in the transference of part of their plant to Hammersmith, which would add considerably to the capacity of that refinery and to the general extension of the combined business. He enumerated the various advantages which were likely to accrue from the amalgamation, and said he looked forward with the greatest confidence to substantial dividends, coupled with a growing appreciation in the market value of the new shares.

The formal resolution for carrying out the scheme was carried unanimously, and Mr. Frederick Morriss Roberts was appointed liquidator. The scheme was also approved at subsequent meetings of the ordinary and deferred shareholders.

The Molassine Co.

At the twelfth annual general meeting of the Molassine Co. (Ltd.), last week, Mr. John Prosser (the chairman and managing director) remarked that the balance sheet showed a profit for the year of £22,263, making with the amount brought forward a total of £27,118. The board proposed to pay two years' dividends on the preference shares, to write off the balance of expense of the issue of debenture stock, to increase the general reserve by £5,000, and to carry forward £5,968.

Business during the year, he said, had been done under changing conditions. About half-way through the Armistice was signed, and Government work, which to a large extent had taken the place of the ordinary manufactures of the company, had immediately ceased. Molasses, one of the principal ingredients in their products, had been required for national purposes during the war, so that their Molassine Meal business had been seriously curtailed. Supplies were now coming along better, and prospects for a large trade in Molassine Meal were excellent.

The board was only afraid that the difficulties of transport would prevent the company from doing as much business as it could. Another serious menace to a large output of dog and poultry foods was the licence imposed by the Government on flour used for those foods. The company had to pay 36s. per sack in addition to the regular cost of the flour. That meant that the buyer had to pay 15s. per cwt. more for his dog and poultry foods. That licence still continued, and made those foods too dear for the ordinary user, who had to look round for substitutes. The sale of Rito had also been affected by a Government order. There had been a fair demand for the horticultural quality, but it had not been what it might have been, owing to the company being compelled to sell the article in bags not weighing more than 14 lb. each. Agricultural Rito had been quite impracticable to sell. He was glad to say that those restrictions had been entirely removed, and the board were looking forward to a better trade next season. The company's factories were well equipped for turning out the finished products, and, despite difficulties, the selling organisation had been kept together, so that it only needed the removal of the remaining restrictions and better transport facilities for a satisfactory future.

The report was adopted.

American Dyes

Protection of a Newly-established Industry

THE present status of the American dye industry, both as to results obtained in spite of war-time difficulties and as to limitations in competitive ability, is clearly shown in a report submitted to the Committee on Ways and Means by the United States Tariff Commission. The report supplements and brings up to date the Census of dyes and coal-tar chemicals for 1917.

Development of Home Production

The production of intermediates has developed to such an extent that the industry is practically independent of imported raw materials; 354,808,315 lb., valued at 123,817,966 dols., was produced during 1918. The grand total of all finished products derived from coal-tar (exclusive of explosives and poison gases) was 75,494,113 lb., valued at 83,095,404 dols., reported by 162 firms. The total production of dye during 1918, reported by 77 firms, was 57,155,600 lb., valued at 61,306,040 dols. This output in 1918 represents a gain of 24 per cent. over 1917. Of even greater importance than the gain in output is the fact that over 300 dyes of improved quality were made during the year, over 100 of which represented varieties new to the American industry. In many cases prices of dyes were considerably reduced.

Synthetic indigo was manufactured by only one firm in 1917, the output being 276,000 lb. During 1918 two other firms entered the field, production increased to 3,083,888 lb., and it is stated that the present plant capacity is substantially greater than the pre-war importation, which, in 1913–14, was 8,507,359 lb. Over 12,000,000 lb. of sulphur black was made, as compared with 5,616,458 lb. imported during the fiscal year 1913–14. The corresponding figures for methyl violet, a triphenylmethane dye, are 632,196 lb. and 255,063 lb. respectively. Four azo dyes were produced in excess of one million pounds each; Alizarin yellow G, 2,233,208 lb.; scarlet 2R, 1,188,798 lb.; naphthylamine black 10B, 1,154,682 lb.; benzo blue 2B, 1,523,985 lb. Excellent progress is also reported in the preparation of coal-tar medicinals and photographic materials The reported production of the highly-prized photographic developer metol (methyl-p-amidophenol sulphate) is 10,975 lb., which is 393 lb. in excess of the 1913–14 importation.

In spite of the rapid advance made by the industry, much remains to be accomplished The great group of dyestuffs derived from anthracene, which includes the fastest dyes known, is practically undeveloped in the United States. During 1918 only 119,774 lb. of anthraquinone and related colours was produced, while 3,300,000 lb. was imported in 1913–14. Much experimental work has been done on these dyes and, provided that Germany is prevented from dumping reserve stocks on the American market, a substantial increase may be expected in production and variety. It will be necessary to improve the methods used for recovering anthracene, so that the residual pitch may still be marketable as a road surfacing material.

As an instance of the close relation between certain dyestuffs and war materials, the manufacture of sulphur black and picric acid is cited. The nitration of monochlorbenzol yields dinitrochlorbenzol, which may be converted into the sodium salt of dinitrophenol by boiling with alkali. This product gives sulphur black by treatment with sodium sulphide and sulphur, or, upon further nitration, picric acid which, in combination with calcium hypochlorite, forms chlorpicrin. It is obvious that a plant making sulphur black in peace times can quickly turn out picric acid and chlorpicrin in a war emergency In addition, picric acid could be made from the phenol (produced synthetically from benzol or recovered during the fractional distillation of coal tar), used in peace times for the manufacture of germicides, medicinals, dyes, phenolic resins, synthetic tanning materials, &c. Normal consumption of phenol is estimated at 10,000,000 lb. per year, while the output for 1918 was 106,794,277 lb.

Licensing System Proposed

In order to determine the best method for protecting the dye industry during the final stages of its development, hearings were recently held before the Ways and Means Committee. Mr. J. H. Choate, Counsel for the Chemical Foundation and the American Dyes Institute, presented a brief showing the need for insuring a permanent domestic industry and outlining the proposed licensing system, which is described as not in the nature of an embargo, but as a temporary measure designed to admit those dyes which the Licensing Commission finds are unobtainable at reasonable prices from domestic sources. The Longworth Bill for import duties on coal-tar products was accordingly re-written to include a license system which will operate for five years to bar out all dyes and intermediates except as the American industry may need them. The Dye Licensing Commission is to consist of eleven members appointed by the President, five of whom will represent the manufacturers (three of these must be actually engaged in the manufacture of coal-tar dyes) and five the consumers (three of these must be actually engaged in the manufacture of cotton, woollen and silk goods, respectively). The remaining member, who will be the chairman, must not be connected with the dye industry, either as manufacturer or consumer.

Coalite Amalgamation Confirmed

AT extraordinary general meetings of British Coalite Co. (Ltd.) and of Coalite (Ltd.), on Wednesday, the resolutions for amalgamation with Low Temperature Carbonisation (Ltd.) were unanimously confirmed, Mr. Henry Bacon and Mr. James Henderson Macaulay being appointed liquidators.

Mr. H. Willmott, who presided, said: The satisfactory position is thus arrived at by which the undisputed pioneers of low-temperature carbonisation are now firmly bound together into one large powerful company. Something like a million pounds sterling has been expended by our companies in research, practically every kind of coal has been tested, and the new company is now possessed of experience lacking in the case of any of our competitors. Never has the time been so opportune for the development of our process. The fact that numerous imitators and references to so-called low-temperature schemes have recently appeared in the Press need give no cause for alarm, as we are secure in our long experience, excellent results and strong financial position; on the contrary, they are a compliment to the progress we have made. I am informed that preparation for the construction of new large-scale plants is already under way, and that contracts are under negotiation which will embrace further large installations. By properly designed and skilfully constructed low-temperature installations real economy in the use of coal can be made and the industrial destruction of this country which is threatened by the rise in coal prices averted. We are assured that we can confidently leave future developments in the hands of the Low Temperature Co.'s technical staff with every prospect of good results.

Books Received

(From the U.S.A. Bureau of Mines Department of the Interior.)

"Innovations in the Metallurgy of Lead." By Dorsey A. Lyon and Oliver C. Ralston.

"Mining and Milling of Lead and Zinc Ores in the Missouri-Kansas-Oklahoma Zinc District." By Clarence A. Wright.

"Sulphur Dioxide Method for Determining Copper Minerals in Partly Oxidised Ores." By Charles S. Van Barneveld and Edmund S. Leaver.

From Week to Week

Work has been resumed at Pritchard's Chemical Works, Port Tennant, Swansea, after some months' stoppage for repairs.

A Professor of Chemistry is required for Hong Kong University, at a salary of £600, with quarters or allowance.

The University of Edinburgh is about to appoint its first lecturer on the organisation of industry and commerce.

The late Mr. Henry Walker, publisher of the *Chemist and Druggist*, left estate of the value of £18,155.

The death has taken place of Mr. Thomas Cole, for thirty-three years secretary of the Institution of Municipal and County Engineers.

An appointment will shortly be made to the Chair of Pathology and Bacteriology at the University of Adelaide, to which a salary of £800 is attached.

The annual general meeting of the North of England Institute of Mining and Mechanical Engineers will be held to-day (August 9) in the Wood Memorial Hall, Newcastle-on-Tyne.

The Huddersfield Technical College has been approved by the Council of the Institute of Chemistry as an institution for the training of candidates for the associateship of the Institute.

At a meeting of the South Wales and Monmouthshire Association of Dispensers, held at Pontypridd last week, it was reported that in all probability the doctors would, in the course of the week, consent to a round table conference on the mimimum scale of wages put forward by the dispensers.

The autumn meeting of the American Electro-chemical Society will be held jointly with that of the American Institute of Mining and Metallurgical Engineers in Chicago during September. Discussions have been arranged on electric steel, non-ferrous metallurgy, catalysis and pyrometry.

An explosion of guncotton which occurred on Wednesday in the laboratory of the Naval Ordnance Store at Bull Point, Plymouth, caused the death of two workmen belonging to the laboratory staff whose experience in dealing with guncotton extended over 20 years.

The annual report of the Board of Scientific Advice for India gives a comprehensive summary of the work carried out by the different departments for the year 1917-18. The section reports deal with applied chemistry, astronomy, meteorology, terrestrial magnetism, geology, geodesy, botany, agricultural bacteriology, forestry, zoology, veterinary science, and medical research.

The methods recommended by the Board of Agriculture for treating plants infested with the "white" or "snow" fly-pest which is making its appearance in greenhouses, are fumigation with hydrocyanic acid gas or repeated fumigation with nicotine or some form of pyrethrin preparation. Where fumigation is impossible frequent applications of soap solution—1 lb. of soft soap to 10 gallons of water, or paraffin emulsion are suggested.

A correspondent of the *Times*, in an article on charcoal as a fuel and an industry, claims that by the revival of the charcoal industry many villages and garden cities might become independent in the matter of fuel, that charcoal production would provide a good livelihood for men who have been soldiers, and that the industry would suit workers with little capital. "The Forestry Bill," he says, "now before Parliament, sets up an authority which could be suitably charged with the duties of giving instruction and generally promoting the revival of an ancient and useful industry."

A boy named Gillard, aged 17, was charged at Newport with stealing fourteen platinum dishes and crucibles, the property of his employer, Mr. G. R. Thompson, county analyst, Dock Street, Newport. It was stated that the value of the utensils was £140 and eight of these had been bought by one person. The lad appeared to have exercised a great deal of ingenuity in disposing of them. The dishes, &c., were of pure platinum, and were used in the laboratory where Gillard was employed as an attendant. In one case three, worth £12, were sold for 13s. 6d. The boy had received £5 from one person, and £2 odd from another, but only a halfpenny was found on him when arrested. The boy was remanded on bail.

In a recent interview, Professor A. M. Tyndall, the new occupant of the Henry Overton Wills Chair of Physics at Bristol University, has given his impressions of a tour of inspection of the scientific laboratories in his subject in the United States and Canada. He considers there has been a great awakening to the value of scientific research as applied to the great problems of reconstruction. This awakening has been mutual: for the scientist himself has become more alive to the needs of industry, and better equipped to deal with them. The present demand in the United States for highly trained scientists and physicists is greater than the supply. In some cases industries are co-operating directly with the Universities by promising to undertake research work; and in other cases firms have erected their own physical research laboratories.

The annual meeting of the American Chemical Society is fixed for September 2–6 at Philadelphia. The adaptation to peace purposes of plants erected primarily for the production of explosives and munitions will be one of the principal subjects for discussion, and Mr. N. D. Baker, Secretary of War, has promised to speak on it. The industrial chemistry and chemical engineering section will have a symposium on refractories which will interest all who are concerned with furnace linings and processes where heat-resistance is required. Another subject to be considered by this section is the revision of the patent law, with particular reference to the charge of a renewal fee to prevent so-called patent pirates from keeping claims on file indefinitely with no intention of developing the patent. A representative of the Patent Office is expected to be present. The newly-constituted rubber section is expected to have a programme of considerable interest.

In a pamphlet by Signor Levio Marchetti on the economic revival of Italy, it is pointed out that before the war Italian chemistry was completely subordinated to German importation, which reached about 200,000,000 lire per annum. As a consequence of the closing of the German market noteworthy enterprises have sprung up. A large vast soda factory (Società Solvay) has been established at Castiglioncello, in Tuscany, and a new factory for the production of caustic and electrolytic soda has been started at Piedimulera, in Val d'Ossola. At Cengio, gathered round the nucleus of the explosive works already in existence, there is an immense factory for the preparation of carbolic acid and various organic and explosive products. The distillation of tar has a foothold everywhere, together with the consequent production of benzol and toluol generators in their turn of a rich train of derivates. Various Italian factories have started the manufacture of artificial colours, formerly imported from Germany so that for the first time it has been possible to dye an Italian flag with Italian-made red and green.

Obituary

MR. WILLIAM THUM.—The American journals announce the death of Mr. William Thum, superintendent of the electrolytic lead refinery of the United States Metals Refining Co., East Chicago, Ind. Mr. Thum was born in Germany in 1863 and received his early education there. In 1879 he went to the United States with his father, Mr. F. A. Thum, who was a graduate mining engineer of the Clausthal School of Mines. In 1883 Mr. William Thum was made assistant superintendent of the electrolytic copper refining department of the Balback Smelting & Refining Co., Newark, N.J., and there, in association with his father, he laid the foundation of electrolytic refining in the United States. At that time the Balbach company was using the Parkes process of lead refining, which was superseded by the electrolytic developments of Mr. Thum and his father. In 1904 Mr. Thum was made superintendent of the De Lamar Copper Refining Co., Chrome, N.J., and in 1906 he was sent to Chicago by the United States Metals Refining Co., in the capacity of superintendent of the electrolytic refinery at East Chicago, Ind. This was the first plant of its kind in the United States, although there were others at Trail, B.C., and at Newcastle-on-Tyne. It was at East Chicago that Mr. Thum developed a number of metallurgical processes, some of which he patented. These related to the recovery of bismuth, tellurium and antimony as by-products in electrolytic lead refining; other patents related to apparatus for use in the Pattersonising process and electrolytic cell for parting Doré bullion. During the war he took an active part in Liberty Loan campaigns, and in the work of patriotic societies of the East Chicago-Hammond district of Indiana.

References to Current Literature

Only articles of general as distinct from specialised interest are included and given in alphabetical order under each geographical subdivision. By publishing this digest within two or three days of publication or receipt we hope to save our readers time and trouble; in return we invite their suggestions and criticisms. The original journals may be consulted at the Patent Office or Chemical Society's libraries. A list of journals and standard abbreviations used will be published at suitable intervals.

British

ALCOHOL. Power alcohol. Commentary on report of Inter-Departmental Committee on production and utilisation of alcohol for power purposes. *J.S.C.I.*, July 31, 264R-265R.

BOILERS. Exact data on running of steam boiler plants. D. Brownlie. *Engineering*, August 1, 138-139. Conclusion of article on colliery boiler plants (see CHEMICAL AGE, August 2), giving summary of results and discussion of economies attainable.

COAL. Oxidation of coal. F. V. Tideswell and R. V. Wheeler. *Trans. Chem. Soc.*, July, 895-902.

Coal conservation. Report of lecture by H. E. Armstrong at British Scientific Products Exhibition. *J.S.C.I.*, July 31, 265R-266R.

DYES AND FINE CHEMICALS. Conference on Dyestuffs, synthetic drugs, and associated products. Papers and discussions. *J.S.C.I.*, 246T-264T.

EXHIBITION. Interesting account of some exhibits of metallurgical furnaces, optical glass and instruments, and measuring and testing machines at British Scientific Products Exhibition. *Engineering*, August 1, 152-154.

FERMENTATION. Conference on recent developments in the fermentation industries. Papers and discussions. *J.S.C.I.*, July 31, 271T-286T. Includes description of manufacture of acetone and butyl alcohol at the King's Lynn factory.

FURNACES. Spray method of closing cracks in retort settings, coke ovens, or furnaces. *Gas J.*, August 5. Satisfactory results have been obtained by forcing a fluid cement into the cracks by a modified paint-spraying machine.

NITRATE. Nitrate position. *Chem. Trade J.*, August 2, 119-120. Discusses prospects of Chile nitrate trade.

ORGANISATION. Inter-Allied Chemical Conference. Account of meeting of delegates, together with the resolutions adopted and a copy of the rules of the International Confederation of Associations for Pure and Allied Chemistry formed by representatives of the Allied nations. *J.S.C.I.*, July 31, 262R-264R.

Inter-Allied Chemical Federation. Paper by Sir W. J. Pope, and discussion. *J.S.C.I.*, July 31, 208T-212T.

PATENTS. Scope of Bill to amend Patents and Designs Act, 1907. *Board of Trade J.*, July 31, 148-150.

POTASH. Value of blast-furnace flue-dust as a potash manure. *J. Board of Agric.*, July, 387-396. Results of field trials on potatoes and mangolds.

POWER. Conference on power plant in chemical works. Papers and discussions. *J.S.C.I.*, July 31, 212T-243T.

STANDARDS. Chemical standards. Suggestions by a Conference of different Societies as to the provision of standard chemical substances. *J.S.C.I.*, July 31, 266R.

TANNING. Conference on the chrome-tanning industry. Papers and discussions. *J.S.C.I.*, July 31, 264T-271T.

TRADE. Consolidated list of import restrictions. *Supplement to Board of Trade J.*, July 31.

American

ASPHALTS. Melting point of asphalts. L. M. Proctor. *Chem. and Met. Eng.*, July 15, 81-83. Comparison of different methods.

BOILERS. Combustion control in mill boiler plant. R. June. *Blast Furnace and Steel Plant*, July, 349-351.

ELECTRICAL PRECIPITATION. Electrical cleaning of blast-furnace gas. W. H. Gellert. *Blast Furnace and Steel Plant*, July, 334-339. Gives account of some results obtained as regards recovery of potash.

ELECTROLYSIS. Electrolytic caustic soda-chlorine cells. K. Horine. *Chem. and Met. Eng.*, July 15, 69-72. Comparison of different types of cells, with chart for use in correlating various factors bearing on the cost of production.

FURNACES. Electric resistance heat-treating furnace. A. M. Clark. *Blast Furnace and Steel Plant*, July, 343-345.

GAS. Manufacturing plant of Providence Gas Co. W. M. Russell. *Chem. and Met. Eng.*, July 15, 88-95. Describes installation and operation of producer-gas and water-gas plants, with accessory measuring and recording apparatus.

Some considerations with regard to fuel gas. F. Crabtree. *Proc. Eng. Soc. W. Pa.*, April. Brief comparison of different fuel gases.

NITROGEN FIXATION. Tabulated cost data in connection with U.S. Government Muscle Shoals plant for fixation of nitrogen by the calcium cyanamide process. *Chem. and Met. Eng.*, July 15, 66-67.

ORGANISATION. Government ownership of water power in relation to the electro-chemical industry. F. A. J. Fitzgerald. *Chem. and Met. Eng.*, July 15, 95-98.

PLANT CONTROL. Thermo-electric pyrometers for plant use. A. O. Aseman. *Chem. and Met. Eng.*, July 15, 85-87.

French

BOILERS. Boiler feed waters. Methods of analysis of the purified water. *Rev. Prod. Chim.*, July 15, 339-342.

RESEARCH. Research in chemical laboratories. *Rev. Prod. Chim.*, July 15, 333-337.

German

BLEACHING POWDER. Review of progress in manufacture of bleaching powder. K. Reusch. *Chem. Zeit.*, July 15, 434-435.

CERAMICS. Concluding section of article on casting of slips, especially of materials other than clay. E. Podsyus. *Chem. Zeit.*, July 12, 426-428.

GAS. Review of progress in utilisation of fossil fuels in years 1914-18. Part of serial article. Deals with natural gas, purification of gas, and measurement and distribution of gases. *Z. angew. Chem.*, July 15, 217-221.

METERS. Electrically operated meters for air and gases. *Z. angew. Chem.*, 222-223. Describes meters, operation of which is based on relation between quantity of gas and increase of temperature produced by addition of known quantity of heat to gas.

ORGANISATION. Is nationalisation or socialisation of the chemical industry possible? F. Grossmann. *Chem. Zeit.*, July 15, 433-434.

PORCELAIN. Modulus of elasticity of porcelain. W. Steger. *Keram. Runds.*, May 8, 113-114. The average value for six samples of technical porcelain from the Berlin State factory was 8280 kilos. per sq. mm.

Dr. Samuel Smiles, F.R.S., of London University College, has been appointed to the newly-created chair of Organic Chemistry at Armstrong College, Newcastle. Dr. Smiles was born in Ulster in 1877, and was educated at Marlborough College and the University College, London. In 1900 he was awarded the Tufnell Scholarship and continued his studies at Jena and Paris. In 1902 he was appointed assistant in the Chemistry Department of the London University College. In 1904 he was elected a Fellow of the College, and three years later was appointed assistant professor. During the war he rendered important service to the Ministry of Munitions as chemical advisor to the Small Arms Ammunition Committee. His works on organic dyes are well known in the industry, and he has a number of papers to his credit.

Patent Literature

We publish each week a list of selected complete specifications accepted as and when they are actually printed and on sale. In addition, we give abstracts within a week of the specifications being obtainable. Readers can thus decide what specifications are of sufficient interest to warrant purchase, the only way of obtaining complete information. Lists of patent applications and of "convention" specifications open to inspection before acceptance are added; abstracts of the latter appear as soon as possible thereafter.

Abstracts of Complete Specifications

118,101. PULVERULENT FUEL, FEEDING DEVICES FOR. Motala Verkstads Nya Aktiebolag, Motala Verkstad, Sweden. International Convention date (Sweden), December 31, 1914.

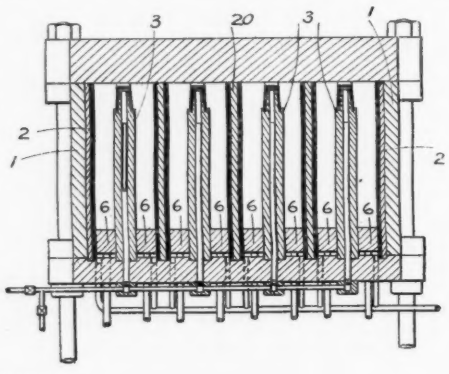
The receptacle containing the pulverulent fuel tapers downwards, and is provided with a number of auxiliary discharge-nozzles for air, arranged so as to direct the air-jets downwards along the inclined walls. The fuel is thereby stirred and entrained by the air, by which it is conveyed to the furnace.

126,274. SULPHIDE OF ZINC, PREPARATION OF ANHYDROUS. P. Comment, 12, Rue Bossuet, Dijon, France. International Convention date (France), April 30, 1918. Addition to 106,489, May 16, 1916.

In the principal patent, anhydrous sulphide of zinc is prepared by calcining anhydrous zinc persulphide with anhydrous zinc sulphate in the presence of alkali sulphate. In this modification the alkali sulphate is replaced by alkali sulphites, hyposulphites, thionates, &c. The persulphide of zinc may be replaced by any other polysulphide of zinc, with or without an admixture of zinc sulphide. This mixture may be obtained by precipitating salts of zinc by means of varying quantities of alkali or alkaline earth polysulphides.

128,964. EXPRESSING LIQUID FROM MATERIALS CONTAINING THE SAME, APPARATUS FOR. C. A. N. Wallich, 49, Cantelupe Road, Bexhill-on-Sea. Application date, April 20, 1917. *See illustration.*

A rectanglar press cylinder 1 is provided with two outer peripheral strainers 2, and three inner double-acting strainers 20, separated by four plane fluid admission plates 3. The press pistons 6 are operated by a hydraulic ram. Each plate 3 is provided with a central vertical pipe, opening at the top into a recess



128,964

running along the top end of the plate, which is in the form of a truncated wedge. The inclined surfaces of the wedge are provided with a number of horizontal passages communicating with the central vertical passage, and the openings of the passages are covered with gauze.

129,002. AROMATIC SULPHONIC ACIDS, ALKALI FUSION OF. South Metropolitan Gas Co., and E. V. Evans, 709, Old Kent Road, London, S.E. Application date, September 17, 1917.

Aromatic sulphonic acids are fused with caustic alkali to produce hydroxy-derivatives, and the alkali sulphite produced is electrolysed so as to obtain caustic alkali. The latter is then returned to the fusion operation. Sulphur dioxide is also produced by the electrolysis, and may be converted into sulphuric acid, which may be returned to the sulphonation operation. The alkali hydroxy-compound may be decomposed by the sulphur dioxide to form alkali sulphite, which is added to the sulphite already referred to. The invention is applicable to the manufacture of phenol, naphthols, &c., from the corresponding sulphonic acids by fusion with caustic soda.

129,024. ETHER AND ALCOHOL FROM VAPOUR-LADEN AIR, RECOVERY OF. Lieut.-Col. R. A. Craig, Dr. R. Robertson, J. I. O. Masson, and A. A. Drummond, Royal Arsenal, Woolwich. Application date, September 26, 1917.

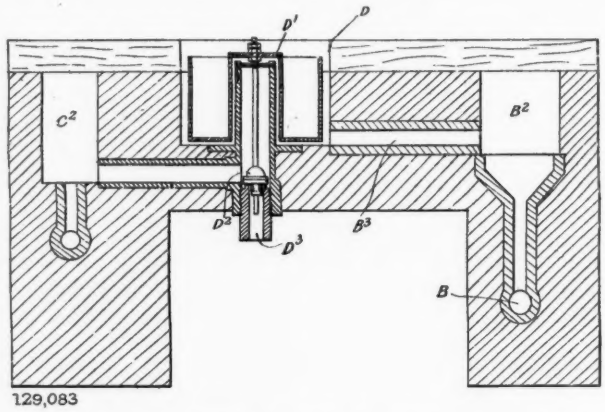
The vapour-laden air is saturated with the liquor of ethyl alcohol, and then brought into contact with liquid ethyl alcohol in a number of towers. The alcohol may alternatively be cooled to 0° C. and used in a single tower. The saturated air is then passed through a tower containing cold water or a salt solution. The alcohol from the first tower or towers may be rectified to separate the alcohol and ether, and the solution from the second tower may be rectified to recover the alcohol.

129,074. TRINITROTOLUOL AND OTHER CRYSTALLISABLE ORGANIC COMPOUNDS, DECOLORISATION AND PURIFICATION OF. H. N. Morris & Co., Ltd., H. N. Morris, and W. J. Sable, Norfolk Street, Manchester. Application date, June 5, 1918.

Crude di- and tri-nitro or ketonic derivatives of benzol, toluol, or naphthalene are introduced, in a melted state or in solution, into a steam-heated vessel, together with silicious material, such as fullers' earth or kieselguhr, and the whole stirred together. The mixture is then filtered in a steam-jacketed filter to remove the silicious material and separate the decolourised and purified compound.

129,083. ELECTROLYTIC CELLS. H. C. Jenkins, 816, Salisbury House, London Wall, E.C., and the C. I. (1914) Syndicate, Ltd., 30, Great James Street, Bedford Row, London, W.C. Application date, June 28, 1918. *See illustration.*

The supply pipe B feeds the solution to the feed tank B^2, which communicates by the passage B^3 with the chamber D. This chamber contains a float D^1, connected to a valve D^2 in an outlet



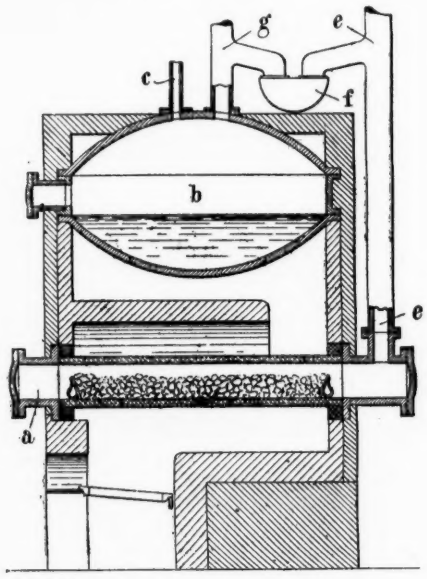
129,083

pipe D^3. The valve controls the outflow from the weir tank C^2 containing the liquid to be discharged. There is no direct communication between the feed tank B^2 and the discharge tank C^2, but the discharge from the latter is automatically controlled by the level of liquid in the former through the medium of the float D^1 and valve D^2.

129,091. PITCH, METHOD OF AND APPARATUS FOR THE DESTRUCTIVE DISTILLATION AND CARBONISING OF. F. M. Perkin, 59, New Oxford Street, London, W.C. 1, and Nitrogen Products and Carbide Co., Ltd, Winchester House, Old Broad Street, London, E.C. 2. Application date, June 29, 1918. *See illustration.*

One or more horizontal retorts *a* of the gasworks type are built

into a setting, and one or more cast or wrought iron stills *b* are arranged above so as to be heated by waste heat. Pitch is fed into the retort *b* by the opening *c*, and is distilled at a temperature not above 600° C., forming a solid residue. This is transferred



129,091

to the retort *a*, and distilled at 900° to 1,000° C. The retort may be connected with a long air-condenser *e*, and one or more catch-pots *f*. Alternatively, horizontal gas retorts may be used for both stages of the process, in which case the low-temperature retorts are provided with stout iron trays.

118,095. Sulphuric Acid, Concentration of. F. Perrin, Volvic, France. Application date, July 4, 1918.

Relates to apparatus made of lava, Volvic stone or pottery, for the concentration of sulphuric acid. The flues are arranged over the pan of acid, and are divided longitudinally into three parallel sections by partitions reaching downward nearly to the surface of the acid. Vertical baffle plates are provided in the flues, dipping into the acid so that the gases are repeatedly deflected at the baffles from one flue to another under the partitions. The gases then pass through a regenerator, consisting of superposed troughs of acid to be concentrated, over which the gases circulate. The bottom of each trough is provided with ribs projecting downward to obstruct the flow of gas and ensure better contact with the acid.

129,139. Retorts for Use in the Destructive Distillation of Coal and the like. J. West, Alton Lodge, Park Crescent, Southport, and W. Wild, Beechwood, Newton Drive, Blackpool. Application date, July 17, 1918.

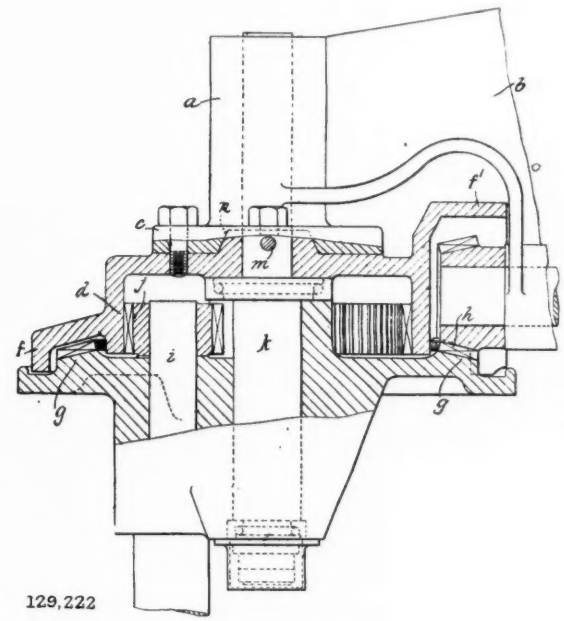
Horizontal and inclined retorts for the continuous destructive distillation of coal are provided with the usual plunger or plungers to feed the material forward. To facilitate the forward movement of the coal, the retort is made tapering downwards in vertical cross section, the sides being preferably curved.

129,199. Pulverised Fuel, Apparatus for Feeding. Fuel Saving Co., Allentown, Lehigh, Pa., U.S.A., Assignees of W. D. Wood, 123, South 16th Street, Allentown, Lehigh, Pa., U.S.A. International Convention date (U.S.A.), September 27, 1918.

Pulverised fuel is fed to a furnace by a pair of parallel, closely adjacent screw conveyors in a common hopper, and an air blast is provided at the forward end of the conveyors to detach the fuel and mix with it before carrying it forward to the furnace. Mechanism is described whereby when the conveyors are detached from the driving gear the air blast is simultaneously cut off, and controlling mechanism for more than one pair of conveyors is also described.

129,222. Mixing and Agitating Machines and Appliances. W. H. Read, 27, Coledonian Road, London, N. 1. (*From Read Machinery Co., Inc. of York, Pa., U.S.A.*) Application date, February 4, 1919. *See illustration.*

A mixing device is described for a machine of the type set forth in Specification 2,919 of 1915. A boss *a* on the frame *b* carries a flange *c*, to which an internally toothed wheel *d* is attached.



129,222

The wheel *d* carries extensions *f*, f^1, enclosing a bevel wheel *g* and pinion *h*. The wheel *g* carries the stirrer shaft *i*, on which the pinion *j* is mounted. The wheel *g* is rotatably carried by a shaft *k*, which is attached to the wheel *d* by a pin *m*. The stirrer *i* is revolved and rotated by the rotation of the driving pinion *h*.

Latest International Convention Specifications Open to Inspection

127,549. Ammonium Sulphate. Soc. Industrielle de Produits Chimiques, 10, Rue de Vienna, Paris. International Convention date, May 27, 1918.

Coke-oven and like gases are treated with sodium bisulphate solution at 70° C., producing sodium ammonium sulphate. This is agitated at its boiling point (111° C.) to precipitate anhydrous sodium sulphate, which is filtered off. Ammonium sulphate is obtained when the solution is cooled to 70° C. Alternatively the sodium ammonium sulphate solution is cooled to 0° C., when hydrated sodium sulphate precipitates, leaving the ammonium salt. In another alternative the double salt may be heated to 350° to 600° C. to obtain ammonia and sodium bisulphate, and the latter is then used over again.

127,554. Coke Ovens. L. Wilputte, New Rochelle, New York. International Convention date, May 27, 1918.

In horizontal coke ovens the metallic framework forms the sides of the frames of the doors closing the ends. The flash plates are provided with flanges, which co-operate with ribs round the door, forming a narrow groove to receive the luting material.

127,566. Alkali Compounds from Silicates, Obtaining. E. Bergve, Nottoden, Norway. International Convention date, May 27, 1918.

Potash feldspar or other alkali alumino silicate is treated at a high temperature with sulphur vapour, with or without sulphur dioxide. The product may be decomposed by water at a high temperature and pressure, or at ordinary temperature and pressure by weak acids, forming a solution of alkali.

127,585. Artificial Fuel. American Linseed Co., 233, Broadway, Manhattan, New York, Assignees of J. Schaub, 16, Avenue C, Newark, N.J., U.S.A. International Convention date, July 17, 1918.

A solid tubulous combustible material is saturated with a combustible liquid. The dimensions of the tubules are such that they exert a capillary action on the contained liquid.

127,590. Coke Ovens. Soc. Franco-Belge de Fours à Coke, 21, Rue du Mont Thabor, Paris. International Convention date, May 29, 1918.

Horizontal coking chambers are provided with reversible regenerators arranged in pairs below them. In the example given, two paris of regenerators are shown, the inner one of each pair being used for heating the air, and the outer one either for air or gas, according to the nature of the gas. The regenerators are reversed by a single valve controlling the outlet to the chimney, and dampers are also fitted in the channels leading from each regenerator.

127,592. Furnaces. E. E. Brosius, 221, Fourth Avenue, Pittsburg, Pa., U.S.A. International Convention date, December 2, 1916.

A charging box is inserted horizontally and withdrawn from a furnace by a tubular charging bar suspended from an overhead crane. The outer bearing of the bar is supported by a chain of fixed length, and the inner by a chain suspended from the hoisting member of the crane. The outer bearing is supported on a transverse horizontal pivot carried by the chain so that the charging bar may swivel in a vertical plane, and the bar is also free to rotate on its own axis while carrying the charging box. The crane is adapted to run on an overhead girder, carrying the charging box and bar with it.

Specifications Accepted, with Date of Application

129,305. Nitric Acid and Ammonia Sulphate, Manufacture of. A. T. Cocking, and Kynoch, Ltd. August 1, 1916.

129,306. Nitro-Phosphate Fertilisers, Manufacture of. A. T. Cocking, and Kynoch, Ltd. August 1, 1916.

129,349. Sulphur from Oils, Removal of. G. F. Forwood and J. G. Taplay. October 27, 1917.

129,393. Coal-Tar, Pitch, and the like for the Production of Fuel, Treatment of. S. Pearson & Son, J. S. Smith, and J. E. Hackford. April 13, 1918.

129,403. Melting-pots or Crucibles. E. G. R. Marks. (*From Driver-Harris Co.*). June 4, 1918.

129,407. Electrically-heated Crucibles, Melting-pots, and the like. Morgan Crucible Co. and C. W. Speirs. June 8, 1918.

129,432. Coke Ovens or the like. J. Marr, W. Colquhoun, and Coke Oven Construction Co. July 9, 1918.

129,433. Coke Ovens or the like. W. Colquhoun, J. Marr, and Coke Oven Construction Co. July 9, 1918.

117,634. Artificial Fuel and Method of Making Same. American Linseed Co. July 17, 1917.

129,461. Fats and Oils, Apparatus for the Hydrogenation of. G. Martin. July 17, 1918.

117,817. Grates, Endless Chain. Compagnie Central D'Energie Electrique. May 17, 1918.

129,495. Liquid Fuel. Pearson & Sons, J. S. Smith, and J. E. Hackford. August 15, 1918.

129,521. Cooling Liquids and Subjecting them to the Influence of Air or Gas. A. Smallwood. September 20. 1918.

120,932. Coke or Carbon from Slag or the like, Separation of. Soc. le Coke Industriel. November 23, 1918.

129,584. Evaporating or Concentrating Liquids. E. Shaw. February 10, 1919.

129,605. Coke-oven Doors and the like. W. H. Wright and E. Fenton. October 7, 1918.

Artificial Coal from Sulphite Lyes

The shortage of coal in Norway has compelled a search for substitutes, and among the substances called into requisition as possible sources of fuel are the sulphite lyes produced as a by-product in paper manufacture. By subjecting these lyes to a special process invented by a Norwegian engineer, Mr. Strehlenert, it is claimed that a satisfactory artificial coal is obtained. The method is briefly as follows :—

The lyes are first freed from lime by treatment with sodium bisulphite, heated up to 110 deg., and a current of air blown in under a pressure of 20 atmospheres. The resulting pulpy mass is freed from water by straining. The free sulphurous acid contained in the lyes is oxidised to sulphuric acid, which, under the high pressure used, decomposes the ligno-sulphates contained in the lyes. The yield of "coal" varies from 540 to 900 kilos per ton of lyes, and according to Mr. Strehlenert a factory producing 25,000 tons of cellulose per annum could obtain 22,000 tons of "coal" by using eight autoclaves each of 10 cubic metres capacity. The price in normal times would be 5 or 6 kronen per ton, but under present conditions it would be 10 kronen. The fuel would be used in the same manner as coal dust. Further experiments are being made.

The Institute of Metals

The autumn meeting of the Institute of Metals, to be held at Sheffield on Wednesday and Thursday, September 24 and 25, will be the first gathering of the Institute out of London since 1913, when it met in Ghent. It is expected some hundreds of engineers and metallurgists from all parts of the world will take part in the proceedings, which will include visits to several famous works.

The technical discussions will take place in the Mappin Hall of the University, and the communications expected include "Moulding Sands for Non-Ferrous Foundry Work," by Professor P. G. H. Boswell; "The Solidification of Metals from the Liquid State," by Professor C. H. Desch; "Observations on a Typical Bearing Metal," by Miss H. E. Fry and Dr. W. Rosenhain; "Season Cracking of Brass," by Dr. W. H. Hatfield and Captain G. L. Thirkell; "The Early History of Electro-Silver Plating," by Mr. R. E. Leader; "The Properties of Standard or Sterling Silver," with Notes on Manufacture, by Messrs. E. A. Smith and H. Turner; "The Ternary Alloys of Tin-Antimony-Arsenic," by Dr. J. E. Stead; "Graphic and Oxide Inclusions in Nickel Silver," by Dr. F. C. Thompson; and "Some Notes on the Constitution and Metallurgy of Britannia Metal," by Dr. F. C. Thompson and Mr. F. Orme.

Arrangements have been made for visits to the works of cutlery silver and electro-plate and steel and armament firms, and for a motor excursion through the Peak district. On Wednesday Sept. 24, the Master Cutler, Sir Alfred Bingham, will entertain the members at lunch in the Cutlers' Hall, and in the evening the Lord Mayor will give a reception in the Town Hall.

Indian Opium in European Medicine

In pre-war times the opium used in this country for medicinal preparations and for the manufacture of morphine was obtained from Turkey and Persia. It was at one time believed that Indian opium was not rich enough in morphine to be employed for these purposes. Although this is true of a large part of the opium prepared in India for export to the East, it is now clearly established that opium suitable in every way for medicinal use in Europe and for the manufacture of morphine can be readily obtained from certain areas in India. So long ago as 1896 the Imperial Institute suggested to the Government of India that the production of medicinal opium for export to Europe should be undertaken. No action was, however, taken in this direction until 1907, when the question was again considered at the suggestion of the Imperial Institute in connection with the restrictions which were then placed on the future export of Indian opium to China. Finally, after the outbreak of war, the Government of India permitted the export of a certain quantity of opium to the United Kingdom for use by manufacturers of morphine, and it is hoped that the trade thus begun will be developed and firmly established.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. Only commodities whose values are at the time of particular interest or of a fluctuating nature are included in our weekly report. A more complete list and report, including a Continental and American report, appears in the first issue of each month, and will include prices of plant supplies, building materials, structural steel, fuels, glues, ores, refractories, metals, minerals, and miscellaneous materials, as soon as the necessary arrangements are completed. Our issue of August 2 contained some of these items. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report. Suggestions and criticisms in regard to these pages will be welcomed.*

Market Report

THURSDAY, August 7, 1919.

THE home trade generally is quiet and unsettled, and there is a distinct tendency on the part of buyers to await developments in the industrial situation. The undertone, however, is quite firm, and there are indications that the present values of some of the heavy products are likely to be increased in the near future.

Export trade is not quite so active, and it is necessary for sellers to be very cautious in naming definite delivery dates with the present unsettled trade conditions.

The Exchange question also has a distinct tendency to restrict business.

General Chemicals

ACID ACETIC.—The cost of production is increasing in the U.S.A., and although prices remain at present unchanged, an advance may shortly be notified.

ACID CARBOLIC.—Several manufacturers are holding out for 9d. for crystal 39-40°, and high prices are expected to rule during the remainder of 1919.

ACID OXALIC.—The business continues to be limited, but no change in price has taken place.

AMMONIUM SALTS.—A fair business is passing, and the demand for chloride and carbonate especially is very good. Makers of sal ammoniac are having to refuse orders.

ARSENIC.—Shipments are being received from countries which have been accumulating stocks for some time, but this market can apparently easily absorb them.

BARIUM CHLORIDE.—Business is very quiet, and there is practically no export business passing.

BORAX CRYSTALS.—Export orders are plentiful, and difficulty is experienced in executing them.

COPPER SULPHATE.—There is nothing to report, and the market is absolutely stagnant.

FORMALDEHYDE.—The firm position of methyl alcohol prevents the makers from reducing the price of formaldehyde to any appreciable extent.

LITHOPONE.—An active business is passing, and prices remain firm, owing to supplies for spot and near delivery being limited.

POTASSIUM CARBONATE.—A substantial reduction in price may shortly be expected, as large quantities are ready awaiting shipment to this country.

SODIUM CAUSTIC.—With higher prices of fuel in sight, the position of caustic is very firm.

SODIUM HYPOSULPHITE.—The price remains unchanged, but will probably be raised immediately the demand increases.

SODIUM PRUSSIATE.—A fair business is passing at recent levels.

SODIUM SULPHIDE is very firm, and if the coal strike continues, in all probability higher prices will have to be recorded.

Heavy Coal Tar Products

There is very little change in this market, but the position generally is uncertain and is likely to remain so until coal supplies are obtainable with something like regularity. Prices as a whole are well maintained, and there is a very firm undertone in the market.

BENZOL.—Home trade remains steady, and more business has been done at 1s. 9d. per gallon export.

CREOSOTE.—There would seem to be a better demand for this product, and the price may be taken at 5½d. per gallon in the North and about 6d. per gallon for London.

CRESYLIC ACID is idle, and the market is easy at from 2s. to 2s. 3d. per gallon.

NAPHTHALINE.—This material is, if anything, rather better, but prices are unchanged at £5 to £6 for crude and £17 to £19 for refined.

PITCH.—This market is quite firm at recent levels.

SOLVENT NAPHTHA.—There is a better tone to this market, and a fair amount of business has been done. Quotations to-day are 1s. 10d. to 2s. in the North and 2s. 2d. to 2s. 4d. in London.

Sulphate of Ammonia

The price of this article is unchanged for home trade and export, and it is not yet possible to state what quantity will be available for export.

Coal Tar Intermediates

There is practically no change in prices since our last issue.

ANTHRACENE.—The 80/85 per cent. is quoted slightly lower. Limited supplies of the 90/95 per cent. are now available.

BETANAPHTHOL is in strong demand, especially for early delivery. Makers are also heavily engaged for forward delivery.

ORTHOAMIDOPHENOL.—There seems to be an increasing demand for this base. Several makes of excellent quality have recently appeared on the market.

TECHNICAL RESORCIN is very scarce for prompt delivery. Makers experience little difficulty in booking orders for their present limited output.

Current Prices

Chemicals

August 7, 1919.

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	2	9	to	0	3	0
Acetone oil	ton	75	0	0	to	80	0	0
Acetone, pure	ton	95	0	0	to	97	0	0
Acid, Acetic, Glacial, 99-100%	ton	80	0	0	to	82	0	0
Acetic, 80% pure	ton	63	0	0	to	65	0	0
Arsenic	ton	50	0	0	to	52	0	0
Boric, cryst	ton	72	0	0	to	73	0	0
Carbolic, cryst. 39-40°	lb.	0	0	9	to	0	0	9½
Citric	lb.	0	4	4	to	0	4	5
Formic, 90%	ton	125	0	0	to	130	0	0
Gallic, pure	lb.	0	6	0	to	0	6	3
Hydrofluoric	lb.	0	0	7	to	0	0	8
Lactic, 50 vol.	ton	66	0	0	to	68	0	0
Lactic, 60 vol.	ton	82	0	0	to	85	0	6
Nitric, 80 Tw.	ton	31	0	0	to	33	0	0
Oxalic	lb.	0	1	2½	to	0	1	3
Phosphoric, 1.5	ton	45	0	0	to	48	0	0
Pyrogallic, cryst.	lb.	0	11	6	to	0	11	9
Salicylic, Technical	lb.	0	1	6	to	0	1	8
Salicylic, B.P.	lb.	0	2	1	to	0	2	3
Sulphuric, 92-93%	ton	7	10	0	to	8	0	0
Tannic, commercial	lb.	0	2	9	to	0	3	0
Tartaric	lb.	0	3	3	to	0	3	4
Alum, lump	ton	17	10	0	to	17	15	0
Alum, chrome	ton	95	0	0	to	97	0	0

	per	£	s.	d.		£	s.	d.
Aluminium, sulphate, 14-15%	ton	13	10	0	to	14	0	0
Aluminium, sulphate, 17-18%	ton	17	0	0	to	17	10	0
Ammonia, anhydrous	lb.	0	1	8	to	0	2	0
Ammonia, .880	ton	32	10	0	to	37	10	0
Ammonia, .920	ton	20	0	0	to	24	0	0
Ammonia, carbonate	lb.	0	0	6½	to		—	
Ammonia, chloride	ton	60	0	0	to	65	0	0
Ammonia, muriate (galvanisers)	ton	48	0	0	to	50	0	0
Ammonia, nitrate	ton	55	0	0	to	57	10	0
Ammonia, phosphate	ton	115	0	0	to	120	0	0
Ammonia, sulphocyanide	lb.	0	2	0	to	0	2	2
Amyl, acetate	ton	215	0	0	to	220	0	0
Arsenic, white, powdered	ton	45	0	0	to	47	0	0
Barium, carbonate	ton	11	0	0	to	12	0	0
Barium, carbonate, 92-94%	ton	12	0	0	to	13	0	0
Chloride	ton	25	10	0	to	26	10	0
Nitrate	ton	51	0	0	to	52	0	0
Sulphate, blanc fixe, dry	ton	25	10	0	to	26	0	0
Sulphate blanc fixe, pulp	ton	15	10	0	to	16	0	0
Bleaching powder, 35-37%	ton	13	0	0	to	13	10	0
Borax crystals	ton	48	0	0	to	50	0	0
Calcium acetate, grey	ton	20	0	0	to	21	0	0
Carbide	ton	28	0	0	to	30	0	0
Chloride	ton	8	10	0	to	9	0	0
Carbon bisulphide	ton	53	0	0	to	54	0	0
Cerium oxalate	lb.	0	3	9	to	0	4	0
Cobalt acetate	lb.	0	7	0	to	0	7	6
Oxide	lb.	0	7	9	to	0	8	0
Copper chloride			—				—	
Sulphate	ton	45	0	0	to	46	0	0
Cream of tartar, 98-100%	ton	235	0	0	to	240	0	0
Epsom salts (see Magnesium sulphate)								
Formaldehyde	ton	122	10	0	to	125	0	0
Formusol (Rongalite)	lb.	0	4	0	to	0	4	3
Glauber salts	ton	3	0	0	to	3	5	0
Hydrogen peroxide, 12 vols.	gal.	0	2	8	to	0	2	9
Iron perchloride	ton	32	0	0	to	34	0	0
Iron sulphate (Copperas)	ton	4	10	0	to	4	15	0
Lead acetate, white	ton	82	10	0	to	85	0	0
Lead nitrate	ton	57	0	0	to	58	0	0
Litharge	ton		—				—	
Lithophone, 30%	ton	44	0	0	to	45	0	0
Magnesium chloride	ton	15	0	0	to	16	0	0
Carbonate, light	cwt.	3	0	0	to	3	5	0
Sulphate (Epsom salts commercial)		11	10	0	to	12	10	0
Sulphate (Druggists')		17	0	0	to	18	0	0
Methyl acetone	ton	89	0	0	to	90	0	0
Alcohol, 0.1% acetone	gall.	0	9	0	to	0	9	6
Nickel ammonium sulphate, single salt	ton	47	10	0	to	52	10	0
Potassium bichromate	lb.	0	1	6	to	0	1	7
Carbonate, 90%	ton	95	0	0	to	97	10	0
Chloride	ton	Nominal.						
Chlorate	lb.	0	1	2	to	0	1	3
Meta-bisulphite, 50-52%	ton	210	0	0	to	220	0	0
Nitrate refined	ton	58	0	0	to	60	0	0
Permanganate	lb.	0	3	6	to	0	3	9
Prussiate red	lb.	0	6	0	to	0	6	3
Prussiate, yellow	lb.	1	9	0	to	0	1	10
Salammoniac, firsts	cwt.	4	0	0				
Seconds	cwt.	3	15	0				
Sodium acetate	ton	52	0	0	to	55	0	0
Arsenate, 45%	ton	48	0	0	to	50	0	0
Bicarbonate	ton	9	0	0	to	9	10	0
Bichromate	lb.	0	0	8	to	0	0	8½
Bisulphite, 60-62%	ton	29	0	0	to	30	0	0
Chlorate	lb.	0	0	7	to	0	0	7½
Caustic, 70%	ton	20	0	0	to	20	10	0
Caustic, 76%	ton	23	10	0	to	24	0	0
Hydrosulphite, powder, 85%	lb.	0	3	3	to	0	3	6
Hyposulphite, commercial	ton	17	10	0	to	18	10	0
Nitrite, 96-98%	ton	56	10	0	to	57	10	0
Phosphate, crystal	ton	25	10	0	to	26	10	0
Perborate	lb.	0	2	2	to	0	2	4
Prussiate	lb.	0	0	7¾	to	0	0	8
Sulphide, crystals	ton	15	10	0	to	16	0	0
Sulphide, solid, 60-62%	ton	22	10	0	to	24	10	0
Sulphite, cryst.	ton	11	0	0	to	11	10	0
Strontium carbonate	ton	85	0	0	to	90	0	0
Nitrate	ton	85	0	0	to	90	0	0
Sulphate	ton	8	0	0	to	10	0	0
Sulphur chloride	ton	38	0	0	to	40	0	0
Flowers	ton	22	0	0	to	24	0	0
Roll	ton	21	0	0	to	23	0	0
Tin perchloride, solution	lb.	0	1	6	to	0	1	9
Perchloride, solid	lb.	0	3	0	to	0	3	3
Protochloride, crystals	lb.	0	1	8	to	0	1	9
Zinc chloride 102 Tw.	ton	22	0	0	to	23	10	0
Zinc chloride, solid, 96-98%	ton	60	0	0	to	65	0	0
Oxide, 99%	ton	80	0	0	to	85	0	0
Oxide, 94-95%	ton	60	0	0	to	62	10	0
Dust, 90%	ton	70	0	0	to	72	10	0
Sulphate, 99%	ton	21	10	0	to	23	0	0

Coal Tar Intermediates, &c.

	per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	3	0	to	0	3	6
Alphanaphthol, refined	lb.	0	3	6	to	0	3	9
Alphanaphthylamine	lb.	0	2	6	to	0	2	9
Aniline oil, drums free	lb.	0	1	2	to	0	1	3
Aniline salts	lb.	0	1	3½	to	0	1	4
Anthracene, 85-90%	lb.	0	1	3	to	0	1	4
Benzaldehyde (free of chlorine)	lb.	0	3	6	to	0	3	9
Benzidine, base	lb.	0	5	6	to	0	6	0
Benzidine, sulphate	lb.	0	4	9	to	0	5	0
Benzoic, acid	lb.	0	5	0	to	0	5	3
Benzoate of soda	lb.	0	5	0	to	0	5	3
Benzyl chloride, technical	lb.	0	1	9	to	0	2	0
Betanaphthol benzoate	lb.	1	6	0	to	1	7	6
Betanaphthol	lb.	0	2	3	to	0	2	6
Betanaphthylamine, technical	lb.	0	6	6	to	0	7	0
Dichlorbenzol	lb.	0	0	5	to	0	0	6
Diethylaniline	lb.	0	7	0	to	0	8	0
Dinitrobenzol	lb.	0	1	4	to	0	1	6
Dinitrochlorbenzol	lb.	0	1	2	to	0	1	3
Dinitronaphthaline	lb.	0	2	0	to	0	2	3
Dinitrotoluol	lb.	0	1	10	to	0	2	0
Dinitrophenol	lb.	0	1	10	to	0	2	0
Dimethylaniline	lb.	0	2	9	to	0	3	0
Diphenylamine	lb.	0	3	0	to	0	3	3
H-Acid	lb.	0	7	6	to	0	8	0
Metaphenylenediamine	lb.	0	4	6	to	0	4	9
Monochlorbenzol	lb.	0	0	9	to	0	0	10
Naphthionic acid, crude	lb.	0	3	6	to	0	3	9
Naphthylamin-di-sulphonic acid	lb.	0	4	6	to	0	5	0
Nitronaphthaline	lb.	0	1	2	to	0	1	6
Nitrotoluol	lb.	0	1	3	to	0	1	6
Orthoamidophenol, base	lb.	0	15	0	to	0	18	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	3
Orthotoluidine	lb.	0	2	0	to	0	2	3
Orthonitrotoluol	lb.	0	1	6	to	0	1	9
Para-amidophenol, base	lb.	0	14	0	to	0	15	0
Para-amidophenol, hydrochlor.	lb.	0	15	6	to	0	16	0
Paradichlorbenzol	lb.	0	0	4	to	0	0	5
Paranitraniline	lb.	0	4	0	to	0	4	6
Paranitrotoluol	lb.	0	5	3	to	0	5	6
Paraphenylenediamine, distilled	lb.	0	14	0	to	0	15	0
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic, anhydride	lb.	0	14	0	to	0	15	0
Resorcin, technical	lb.	0	11	0	to	0	12	0
Resorcin, pure	lb.	0	17	6	to	1	0	0
Salicylic acid	lb.	0	2	1	to	0	2	3
Salol	lb.	0	4	6	to	0	5	0
Sulphanilic acid, crude	lb.	0	1	2	to	0	1	0
Toluidine, base	lb.	0	9	0	to	0	10	3
Toluidine, mixture	lb.	0	2	9	to	0	3	0

Miscellaneous and Paint Materials

Barytes	ton	12	0	0	to	14	0	0
Casein	ton	75	0	0	to	80	0	0
Chalk, precipated (light)	ton	20	0	0	to	24	0	0
Chalk, precipated (heavy)	ton	10	0	0	to	12	0	0
China clay (bags extra) (f.o.r. Cornwall)	ton	1	12	6	to	3	12	6
Coke (blast furnace)	ton	3	15	0	to	4	0	0
Coke (foundry)	ton	3	15	0	to	4	5	0
Fuller's Earth	ton	4	0	0	to	5	0	0
Lead, litharge flake	ton	42	10	0	to	45	0	0
Lead, red	cwt.	2	2	6	to	2	7	6
Lead, white	cwt.	2	10	0	to	2	15	0
Ultramarine	ton	80	0	0	to	100	0	0
Prussian Blue	cwt.	11	0	0	to	11	10	0
Chrome green	cwt.	6	5	0	to	6	10	0
Chrome yellow	cwt.	6	5	0	to	7	0	0

Anglo-American Trade

Mr. B. S. Cutler, director of the Bureau of Foreign and Domestic Commerce, Washington, is now in London. The object of Mr. Cutler's visit is to ascertain the exact industrial position of Great Britain, and to investigate the possibility of developing the importation of British products to the United States. Arrangements are being made for Mr. Cutler to meet leading manufacturers and commercial men of this country, and it is hoped that among the results of his visit will be a great increase in British trade with the United States.

Company News

ANGLO-JOHORE RUBBER.—The accounts for the year ended March 31 show a net yield of £2,999, against £12,810, after allowing 10 per cent. for depreciation. With £14,714 brought in, the amount standing to the credit of profit and loss account is £17,713. Dividend of 8 per cent., less tax; forward, £14,353. For the preceding year no dividend was paid.

BRITISH GLASS INDUSTRIES.—The directors of the British Glass Industries Company recommend the capital be increased to £600,000 by the creation of 300,000 Ordinary shares of £1 each, and that one new share be offered at £2 10s. for every share now held. The issue will provide further working capital and for the purchase of the Queenborough Glass Bottle Works, Ltd., and the British and Foreign Bottle Company, and also a large interest in an automatic sheet glass process, the English rights of which have been purchased from the Belgian proprietors.

BUKIT MERTAJAM RUBBER.—At the annual general meeting last week a dividend was declared of 12½ per cent., less tax. The Chairman, in moving the adoption of the report and accounts, said that the output was much inferior to that of the previous year, due to the fact that the company was one of the number of plantations which adopted the policy of restriction in output recommended by the Rubber Growers' Association. The effect of that was to add to their cost of production per lb. on the estate, and also to the all-in cost of the rubber. They naturally looked for a reduction of last year's figure on the current year's working. That was only one of the factors that made the year under review one of anxiety to all concerned. Many uses remained to which the commodity could be put, in addition to what was called for by present consumptive demands, even if it was only in the matter of mechanical traction. There was no reason why the United Kingdom, as well as other countries, particularly European neutrals and our late enemies, should not dispose of a quantity of the raw material equalling the normal consumption per head of the population in the United States.

PRICE'S PATENT CANDLE.—Interim dividend of 15s. per share for the half-year ended June 30, and a bonus of 5s. per share, less tax, payable on September 26.

ROYAL DUTCH PETROLEUM.—The total profits of the Company for 1918 amounted to 72,190,311fl., against 44,373,569fl. Dividend of 40 per cent. on the Ordinary shares, of which 15 per cent. has already been paid as an interim, absorbed 68,421,760fl., leaving a balance of 1,146,230fl. to be carried forward. For 1917 the dividend was 48 per cent. Owing to prevailing conditions and slow postal communication it has again been possible to make up the balance-sheet of the Anglo-Saxon Petroleum and Asiatic Petroleum Companies, so the profits shown for these accounts are based on estimates.

VALLAMBROSA RUBBER.—The profit for the year to March 31, after charging to revenue the whole of the capital expenditure for the year, was £15,874, against £44,737, to which is added £29,128 brought in, making £45,002. The directors recommend a final dividend of 37½ per cent., less tax, making with the interim already paid 62½ per cent. for the year, against 75 per cent. for 1917–18, leaving £22,865, against £30,555, which the directors think advisable to carry forward in view of the general state of unsettlement at present prevailing. The amount of rubber harvested during the year was 862,383 lb., the restricted estimate of 896,389 lb. not being reached owing in part to the severe influenza spidemic. The estimated crop for the current year is 1,112,000 lb.

WRAY, SANDERSON & CO.—At the ordinary general meeting on Wednesday dividends were declared of 8 per cent., less income tax, on the Preference shares, and of 10 per cent. and 25 per cent., free of income tax, on the Ordinary shares. The chairman (Mr. H. Guedalla) explained that last May a new company, named the United Premier Oil and Cake Company, was formed to acquire the businesses of the Premier Oil Extracting Mills, Ltd., J. L. Seaton & Co., Ltd., Sowerby & Co., Ltd., and as many shares as it might be possible to obtain in their own company. Out of a capital of 85,552 Ordinary shares there only remained shareholders representing about 1,600 shares who preferred not to exchange their holdings. The enterprise of the United Premier Oil and Cake Company was controlled in Hull by an experienced and most capable executive, and it was out of that body that the new directors will be nominated. Mr. Caley, the chairman of that executive, would become the chairman of that company, and the other directors associated with him would be Mr. George Waterland Ingleby, Mr. Cyril E. Kidd, Mr. Frederick Till, Mr. Andrews, and possibly another gentleman. With regard to himself and his colleagues, they had all ruined the board of the United Premier Oil and Cake Company.

Mr. Justice P. O. Lawrence, has, sanctioned the petition of the Premier Oil and Pipe Line Co., Ltd., for a reconstruction. Mr. Jenkins, K.C., said this was a scheme of arrangement made with the shareholders under Section 120 of the Act. It was necessary to obtain further capital. The company's property was in Eastern Galicia, and the latest news was that Eastern Galicia was to go to Poland. The company would go into voluntary liquidation for the purpose of the reconstruction.

Stocks and Shares

Commercial, Industrial, &c.

	Quotations July 30	Quotations Aug. 6.
Alby United Carbide Factories, Lim., Ord.	15/16–1 1/16	31/32–1 1/32
Associated Portland Cement Manufrs. (1900.) Lim., Ord.	7 11/16–7 15/16	7 1/2–7 3/4
Bell's United Asbestos Co., Lim., Ord.	1 15/16–2 1/16	2–2 1/8
Bleachers' Association, Lim., Ord.	1 1/32–1 3/32	1 1/16–1 3/32
Borax Consolidated, Lim., Prefd. Ord.	4 1/4–4 3/4	4 1/4–4 3/4
Bradford Dyers' Assoc. Lim., Ord.	2 5/16–2 5/16	2 5/16–2 5/16
British Aluminium Co., Lim., Ord.	1 9/16–1 11/16	1 9/16–1 11/16
British Oil and Cake Mills, Lim., Ord.	2 7/32–2 9/32	2 7/32–2 9/32
British Portland Cement Manufrs., Lim., Ord.	31/0–33/0	31/0–33/0
Brunner, Mond & Co., Lim., Ord.	2 1/32–2 5/32	2 1/16–2 3/16
Castner-Kellner Alkali Co., Lim.	2 5/8–2 7/8	2 5/8–2 7/8
China Clay Corporation, Lim., Ord.	1/4–3/8	1/4–3/8
Cook (Edward) & Co., Lim., 4% 1st Mort. Deb. Stock Red.	57–61	57–61
Courtaulds, Lim.	9 3/4–10 1/4 xd	9 3/4–10 1/4 xd
Crosfield (Joseph) & Sons, Lim., Cum. 6% Prefce.	7/8–1 1/8	7/8–1 1/8
Curtis's & Harvey, Lim.	2 9/16–2 13/16	2 9/16–2 13/16 xd
Explosives Trades, Lim., Ord.	20/9–21/9	19/6–20/6
Field (J. C. & J.), Lim., Ord.	7/16–9/16	7/16–9/16
Greenwich Inlaid Linoleum (Fredk Walton's New Patents) Co., Lim., Ord.	1/2–5/8	1/2–5/8
Harrisons & Crosfield, Lim., 10% Cum. Prefd. Ord.	1 11/32–1 15/32	1 11/32–1 15/32
India Rubber, Gutta Percha and Tel. Wks. Co., Lim., Ord.	17 1/8–17 5/8	17 1/8–17 5/8
Lawes' Chemical Manure Co., Lim., Ord.	6–6 1/2	6–6 1/2
Lever Bros., Lim., 6 % Cum. "A" Pref.	19/4 1/2 19/10 1/2	19/4 1/2 19/10 1/2
Do. 6½ % Cum. "B" Pref.	19/10 1/2 20/4 1/2	19/10 1/2 20/4 1/2
Magadi Soda Co., Lim., Ord.	1–1 1/8	1 1/16–1 3/16
Manganese Bronze and Brass Co., Lim., Ord.	11/16–13/16	11/16–13/16
Maypole Dairy Co., Lim., Defd. Ord.	1 1/4–1 5/16	1 7/32–1 9/32
Mond Nickel Co., Lim., 7% Cum. Pref.	1–1 1/8 xd	1–1 1/8 xd
Do. 7% Non. Cum. Pref.	15/16–1 1/16 xd	15/16–1 1/16 xd
Pacific Phosphate Co., Lim., Ord.	5 1/2–5 3/8 xd	5 1/2–5 3/4 xd
Power-Gas Corporation, Lim., Ord.	3/4–7/8	3/4–7/8
Price's Patent Candle Co., Lim.	38–40	38–40
Salt Union, Lim., Ord.	1 9/32–1 13/32	1 9/32–1 13/32
United Alkali Co., Lim., Ord.	1 1/4–1 1/2	1 1/4–1 1/2
Val de Travers Asphalte Paving Co., Lim.	15/16–1 1/16	15/16–1 1/16
Van den Berghs, Lim., Ord.	3 5/16–3 7/16	3 5/16–3 7/16
Walkers, Parker & Co., Lim.	1 1/32–1 5/32	1 1/32–1 3/32
Welsbach Light Co., Lim.	2 3/8–2 5/8	2 7/16–2 7/16

Gas, Iron, Coal and Steel

Armstrong (Sir W. G.) Whitworth, Ltd., Ord.	34/6–35/6	34/9–35/9
Ebbw Vale Steel, Iron & Coal Co., Lim., Ord.	1 7/32–1 9/32 xd	1 7/32–1 9/32 xd
Gas Light and Coke Co., Ordinary Stock (4% Stand.)	51–54 xd	51–54 xd
Hadfield's, Limited, Ordinary	1 27/32–1 29/32 xd	1 27/32–1 29/32 xd
South Metropolitan Gas Co., Ordinary (4% Stand.)	53–56	52–55
Staveley Coal & Iron Co., Lim., Ord.	1 11/16–1 13/16	1 11/16–1 11/16
Vickers, Limited, Ordinary	35/0–36/0	34/6–35/6

Mines, Nitrate, &c.

Anglo-Chilian Nitrate and Rly. Co., Ltd., Ord.	13 1/2–14 1/2	13 1/2–14 1/2
Antofagasta Nitrate Co. Compa ia de Salitres de Antofagasta) 5½% 1st. Mt. Debs. Red.	88–93	88–93
Lagunas Nitrate Co., Lim.	1 1/2–1 3/4	1 1/2–1 3/4
Rio Tinto Co., Lim., Ord. (Bearer)	61–62	59 1/2–60 1/2
Tarapacá and Tocopilla Nitrate Co., Lim.	14/6–15/6	14/6–15/6

Oil and Rubber

Anglo-Java Rubber & Produce Co., Lim.	5/10 1/2–6/4 1/2	5/9–6/3
Anglo-Maikop Corporation, Ltd., Ord.	5/6–6/6	5/6–6/6
Anglo-Malay Rubber Co., Lim.	12/7 1/2–13/1 1/2	13/0–13/6
Anglo-Persian Oil Co., Lim., Cum. 6 % Part.	1 9/32–1 11/32	1 9/32–1 11/32
Burmah Oil Co. Ltd., Ord.	13 3/8–13 5/8	14 1/8–14 3/8
Chersonese (F.M.S.) Estates, Lim.	3/7 1/2–3/10 1/2	3/9–4/0
Linggi Plantations, Lim., Ord.	.. ..	.. ..
Mexican Eagle Oil Co., Lim. (Cia Mexicana de Pet. "El Aguila" S.A.) Ordinary	8 5/8–8 3/4	8 5/8–8 3/4
"Shell" Transport and Trading Co., Lim., Ord.	9 3/32–9 7/32	9 5/16–9 7/16
Do. 5% Cum. Pref.	9 1/8–9 3/8	9 1/8–9 3/8

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

LONDON GAZETTE

Liquidator's Notice

THE COTE HOLME CHEMICAL CO., LTD.—A general meeting will be held at the Chamber of Commerce, 4, Richmond Terrace, Blackburn, on Sept. 3, at 11 a.m. Guy Waterworth, liquidator.

Company Winding up Voluntarily

THE ABBEY CHEMICAL CO., LTD. (C.W.U.V. Aug. 9, 1919.)—At an extraordinary meeting of the shareholders, held at 181, Queen Victoria Street, London, E.C.4, on July 28, the following resolution was duly passed: "That it has been proved to the satisfaction of the Meeting that the company cannot, by reason of its liabilities, continue its business, and that it is desirable to wind up the same, and that the company be wound up voluntarily accordingly. Mr. Arthur H. Hughes, 67, Basinghall Street, London, E.C. 2, incorporated accountant, appointed liquidator."

Bankruptcy Notice

FAWN, Frederick Charles, 27, Claremont Road, Bishopston, Bristol carrying on business at 348, Gloucester Road, Bristol, chemist (R.O. Aug. 9). July 30, 1919.

Application for Debtor's Discharge

LAWS, John Joseph, 14, Greyhound Lane, Streatham Common, Surrey, chemist and druggist (A.F.D. Aug. 9, 1919). Oct. 20, 10.30 a.m. Court House, Garratt Lane, Wandsworth.

New Companies Registered

The following list has been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C.:—

AGRICULTURAL DIRECT SUPPLY CO., LTD., 119, Guild Lane, Hooley Hill, Lancaster. To carry on the business of manufacturers of cattle and poultry food and feeding and fattening preparations of every description, manufacturers of artificial manures and fertilizers, &c. Nominal capital, £1,000 in 1,000 shares of £1 each. Directors: R. Lillie, Beech House, Roe Cross, Mottram-en-Longdendall; W. Lowe, 8, Stanley Street, Fairfield, Manchester; G. E. Lowe, senr., 118, Mount Pleasant Street, Hooley Hill; G. E. Lowe, junr., 118, Mount Pleasant Street, Hooley Hill; S. Lowe, 118, Mount Pleasant Street, Hooley Hill. Qualification of Directors, £200.

AJAX ANILINE DYE MANUFACTURING CO., LTD., 119–120, London Wall, E.C. To carry on the business as indicated by title. Nominal capital, £50,000 in 47,000 preference shares and 3,000 ordinary shares of £1 each. Directors: F. Young, 60, Aldermanbury, E.C. (Chairman); E. I. Pronk, 119–120, London Wall, E.C.; E. A. Gedge, 7, King Street, E.C.; and three others. Qualification of Directors, £100. Remuneration of Directors, £2,500 to be divided.

ANGLO-BALKAN TRADING CO., LTD.—To acquire mines, mining rights and metalliferous or petroleum and timber land, and turn same to account. Nominal capital £10,000 in 5,600 10 per cent preference shares and 5,000 ordinary shares of £1 each. Qualification of directors other than first directors £100. Remuneration of directors £100 each. Chairman £150. Subscribers, J. C. Screwens, 24, College Street, Cannon Street, E.C.4.; R. V. Flower, 21, Keith Grove, Shepherd's Bush, W.

ASSOCIATED NIGERIAN TIN MINES, LTD., To acquire any tin mines, gold mines, coal mines and other mines. Nominal capital £275,000 in 1,000,000 shares of 5s. each. Minimum subscription, seven shares. Qualification of Directors, £250. Remuneration of Directors, £200 each. Chairman, £400. Subscribers, C. W. Longman, 11-12, Clements Lane, E.C.; G. P. Dennis, 111-12, Clements Lane, E.C., and five others.

AUSTRALIA CONCRETE BLOCK MACHINE SYNDICATE, LTD.—To carry on the business of manufacturers of concrete, stone and cement manufacturers, &c. Nominal capital £2,000 in 8,000 shares of 5s each. Directors: Percy Evans, 55, Comreagh Road, West Kensington; C. C. Cannell, 2, Creswick Walk, N.W.4. Qualification of directors, one share.

EDWARD G. ANNELY & CO., LTD., Trafalgar Lane, Sheffield, drysalters, oil and colourmen, importers and manufacturers of and dealers in chemical preparations, &c. Nominal capital £5,000 in 4,500 7½ per cent. cumulative part. preference shares of £1 each, and 2,000 ordinary shares of 5s. each. Directors to be appointed by subscribers. Qualification of Directors, 1 share. Remuneration of Directors to be voted by company in general meeting.

BRITISH DOMINIONS OIL CORPORATION, LTD. To acquire any petroleum or oil-bearing lands. Nominal capital, £100 in 100 shares of £1 each. Qualification of directors, 1 share. Subs.; H. W. Brown, Sebastapol Cottage, Owlsmoor, Berks; E. T Church, 38, Solon New Road, Clapham S.W. 4.

BRITISH MEXICAN PETROLEUM CO., LTD., transporter and carriers of oils and petroleum and their products and ingredients, and to buy, sell, refine and deal in oil gas and other minerals. Nominal capital £2,000,000 in 1,000,000 "A" ordinary shares of £1 each, and 1,000,000 "B" ordinary shares of £1 each. Directors: Rt. Hon. Lord Perrie, W. Weir, Esq., Sir T. Rooden, Bart., Sir P. McClilland, J. B. R. Morton, Esq., and seven others. Qualification of Directors, £100. Renumeration of Directors, £500. Chairman, £1,000. Subscribers: J. T. Cooke, "Milrose," Whitworth Road, S. Norwood, S.E.15; H. H. Austwick, "Ganton," Sidcup, Kent.

BRITISH WINDOW GLASS CO., LTD., glass manufacturers, &c. Nominal capital £450,000 in 400,000 preference shares of £1 each and 1,000,000 ordinary shares of 1s. each. Minimum subscription, 7 shares. Directors: J. R Payne, 17, Regent's Park Terrace, Gloster Gate; P. J. Mitchell, "The Shanty," Staines, Middlesex, Sir M. E. Clarke, Long Acre, Oxted, Surrey. Qualification of Directors, £500. Remunera on of Directors, £400 each (Chairman, £500).

CINDERFORD CONSOLIDATED IRON MINES, LTD., 12, Mark Lane, E.C. To carry on the business of mining, smelting and refining company. Nominal capital, £15,000 in 15,000 shares of £1 each. Qualification of Directors, 500 shares.

COLUMBIA NAVAL STORES CO., LTD.—Merchants, dealers, manufacturers, and brokers of rosin, turpentine, pitch tar, tar oils, rosin oils, &c. Nominal capital £10,000 in 1,000 shares of £10 each.

COOPER METALS (COVENTRY), LTD., dealers in, and manufacturers of metals. Nominal capital, £3,000 in 3,000 shares of £1 each. Directors: H. Cooper, Shaftesbury Road, Coventry; H. B. Stocks, 109, Chesbignto, Stockport. Qualification of Directors, 1 share. Remuneration of Directors to be voted by company in general meeting.

A. & N. CATTO, LTD., 49, Cranbrook Road, Ilford, Essex, chemists, druggests, drysalters, &c. Nominal capital £1,000 in 1,000 shares of £1 each. Directors: Nora Catto, A. Catto (both First Directors). Qualification of Directors: First Director, £1. Others £100. Remuneration of Directors, £25.

J. R. DENISON & CO., LTD., Valley Dyeworks, Bradford, dyers and finishers. Nominal capital, £120,000 in 120,000 shares of £1 each. Directors: J. R. Denison, Lingholme, Heaton, Bradford; A. Nelson, Manor House, Thornton-in-Craven, near Skepton; P. R. Nelson, Cheswall, Nelson, and four others. Qualification of directors, 1,000 ordinary shares.

EASTERN COUNTIES BONE PRODUCTS CO., LTD, The Duxford Works, Duxford, Cambs., bone, manure and glue manufacturers, tallow melters and poultry food specialists. Nominal capital, £20,000 in 20,000 shares of £1 each. Directors: A. G. Stirling, "Rooke," Beechurst, Duxford, Cambs; W. T. Powling, The Colonies, Prittlewell, Essex. Qualification of Directors, £50. Remuneration of Directors, £1 1s. each meeting.

MILLOM & ASKAM HEMATITE IRON CO., LTD., The Works, Millom, Cumberland. To acquire and carry on the business of iron mining and smelting, miners, colliery owners, iron-masters, iron and steel manufacturers, &c. Nominal capital, £2,000,000 in 500,000 7 per cent. Cumulative Preference Shares, and 1,500,000 ordinary shares of £1 each. Directors: H. P. Geard, 144, Boyson Road, S.E.; C. MacLeod Carey, Wendover, East Grinstead. Qualification of directors, other than first directors, £1,000. Remuneration of directors, £4,500, to be divided.

PREMIER ELECTRIC WELDING CO., LTD.—To carry on business of welding of metals or other substances by electrical, ocyacity-line. Nominal capital £75,000 in 75,000 shares of £1 each. Qualification of directors £100. Subscribers: J. G. Coke, Bank Buildings, St. James' Street, S.W.1., A. Haggerty, Bank Buildings, St. James' Street, S.W.1.

RHODESIA BASE METALS, LTD., 1, Broad Street Place, E.C.2.—To acquire freehold or other farms, properties, mines and mineral properties, &c. Nominal capital £10,000 in 40,000 shares of 5s. each. Qualification of directors, £100. Remuneration of directors £150 each. Chairman £200. Subscribers: G. S. Adam, 18, Northampton Street, Canonbury, N.1.; F. Stone, 55, Holloway Road, N.19, and five others.

RIDGACRE IRON & STEEL WORKS, LTD.—To carry on business of manufacturers of iron, steel and every kind of metal and alloy, &c. Nominal capital £13,000 in 13,000 shares of £1 each. Directors: G. P. Pitt, Oakfield, Stourbridge, A. R. Banks, Hall Place, Barnt Green; H. J. Haden. Qualification of directors £500.

SAMUEL PEARSON (WEST BROMWICH), LTD.—To acquire and carry on the businesss of manufacturing glass. Nominal capital £50,000 in 10,000 preference and 40,000 ordinary shares of £1 each. Directors: J. D. Harward, Stourbridge; S. Pearson, Chacks Street, West Bromwich; C. Jackson; J. S. Williams-Thomas, H. Webb. Qualification of directors £500.

SPARKLETS, LTD., 109 Victoria Street, Westminster, S.W. 1. To acquire work and turn to account patents and carry on the business of chemists, analysts, &c. Nominal capital, £300,000 in 300,000 shares of £1 each. Minimum subscription, 7 shares. Directors: J. W. Orde, Harford House, Beaulieu, Hants.; A. W. Haschke, Rosecombe Lodge, Pembroke Road, Woking; G. C. Aguet, "The Millhouse," Holmwood; and three others. Qualification of Directors, 200 ordinary shares. Remuneration of Directors, £1,000 to be divided.

SULTANEER CHOCOLATE CO., LTD. To import, export, refine, manufacture, and generally trade in chocolate. Nominal capital, £3,000 in 2,000 10 per cent. part. Preference shares of £1, and 2,000 10s. Deferred shares. Directors: H. Valeriam, 21, Chesilton Road, Fulham, S.W. 6; S. Levy, 13, Mead Row, Westminster Bridge Road, S.E. Qualification of directors, 1 share.

WILTON, SLATER & DOBSON, LTD., Old Castle Buildings, Preeson's Row, Liverpool, coal, coke, lime, limestone and oil fuel merchants, &c. Nominal capital, £20,000 in 20,000 shares of £1 each. Directors: T. Wilton, Kt., Hawarden, Dartmouth; J. Slater, 7, East India Avenue, E.C.; F. Dobson, Chelston Dene, Torquay Qualification of directors, £1,000 Remuneration of directors, £500, to be divided.

Losses in Soap Dealing

Mrs. Sarah Alice Duffield, who had been adjudged a bankrupt as a member of the firm of Lindley, Duffield & Co., merchants, 1 and 2, Great Winchester Street, E.C., which principally dealt in soap, has submitted a statement of its affairs in which she returns the liabilities at £8,508 11s. 2d., and states that the assets consist of stock in trade £800, which she estimates to realise £50 and some book debts of the face value of £200, which she treats as valueless. In the deficiency account she states that the firm's assets on July 31, 1917, exceeded their liabilities by £50, and among the reasons for the loss of that sum and for the creation of the present deficiency of £8,458 11s. 2d. she states that a law case which the partnership defended involved a direct loss of £3,500, and that the fall in the price of soap and the indirect effect of the law case caused other losses, soap which was selling at £45 to £50 a ton, dropping to £10. She returns this item at £4,008 11s. 2d., and adds that the quality of soap which was held by the firm became in effect practically unsaleable.

A sitting for the public examination of Mrs. Duffield was appointed at the London Bankruptcy Court on Wednesday week, before Mr. Registrar Hope. In reply to his Honour, the Official Receiver said that the case was really now one of Mrs. Duffield and Mr. Weller, an order adjudging him bankrupt as a partner having been made. So far as he was aware she and Mr. Weller were the only partners, and the latter had not yet agreed to the joint statement of affairs as lodged by Mrs. Duffield. Mr. Weller remarked that he was quite prepared to subscribe to this document, and upon the application of the Official Receiver the examination was further adjourned.

The creditors of £100 and over include :—

	£	s.	d.
Allen, Jno., London	421	9	0
F. J. Coxhead, Leytonstone	250	0	0
J. A. Davis, London	100	0	0
T. J. Duffield, London	700	0	0
Hull Oil Manufacturing Co., Hull	400	0	0
Ironmonger, Ltd., London	120	0	0
Reginald Godfrey & Co., London	900	0	0
Achille Serre, Ltd., Hackney	2,000	0	0
Ticklers, Ltd., Southall	160	3	2
Wilkie & Soames, Greenwich	107	10	0
Zeyenand Co., London	3,000	0	0

Labour in the English Chemical Industry*

By A. E. Marshall

In pre-war days in England, labour costs in the production of any of the staple chemicals were not the subject of very careful consideration by factory managers. Labour was plentiful and cheap, and as a result of the continuous excess supply, labour invariably, under the stimulus of retaining its hold on a job, was efficient.

All this has changed, and to-day the most important item in costs is labour. Very little attention had been paid, prior to 1914, to the use of labour-saving devices, and the plants were of such design that many of the standard forms of mechanical equipment, such as find use in the American industry, could not be utilised.

Factories erected during the war have had incorporated in their design a considerable amount of mechanical equipment, but in most cases these factories are not readily capable of change from specialised war products to staple chemicals, so that factory equipment as a whole is little in advance of pre-war conditions.

As a direct outcome of the discovery during the war of the power it possessed, labour has changed its former subservient relationship to capital, as represented by the factory owners, and at this present time it has apparent control of the industries. Hours have been shortened, rates of pay have been greatly increased, and the men no longer feel that there is any necessity of doing a real day's work. It takes more men to perform a given operation now than it did in pre-war times, and as rates are up at least 120 per cent., the resulting increase in cost of production can be imagined. One manufacturer told me that whereas his labour cost on a certain product was 11 c. per 100 lb. before the war, it was now in excess of 30 c., and likely to go even a shade higher.

There is a feeling of unrest in the factories which is not confined to the workmen, but extends to the salaried staffs, who have always before them the contrast of inefficient labour paid at high rates, and their own high living costs, high income-tax rates, and only slightly increased salaries. As an instance of the general complaint in this direction, recent papers carried letters from a Judge and a Bishop, each presenting a budget of his expenses, and each proving rather conclusively that he could not make both ends meet without a substantial change in his pre-war salary.

Labour in the chemical industry was not organised before the war, as the only attempt to form a union (in 1895) failed through lack of support. Now there is a fairly strong union body, with about 40,000 members, affiliated with the National Federation of General Workers. A ballot is to be taken shortly by this union on the question of handing in notices to enforce twelve hours' pay for eight-hour shifts with a forty-four hour week, and there does not seem to be much doubt as to the result being in favour of the strike notices. So the path of the manufacturer seems to have difficulties present and ahead.

One totally unexpected feature is the disappearance of women from the industry. While the war was in progress, the English newspapers which reached America carried column after column about women who had found a niche in industry. Every trade opened its formerly closed gates to the woman worker, and by general consent women were conceded a permanent place in the industrial world. And now, before even demobilisation is complete, women's hold on the industries has slipped, and without an apparent struggle the woman worker has been dispossessed and a man has her place. There are of course minor exceptions, but in the factories which were staffed by men in the pre-war days, women have done their day and service, and are already passing into a remembrance. One friend, showing me through his plant, said: "I had over 200 women in this department from late '15 to early this year—but now I haven't one." He had no explanation as to why or where his women workers had gone, and he had too many other troubles to waste time on any abstruse speculations, the simple fact being that they had gone.

Another factory I have just visited was busy during the war in the manufacture of scientific apparatus. I had heard of this factory as an example of the development of women workers to a high state of efficiency, but I found only four women left, and men, incompetent because of inexperience, turning out work that was obviously crude.

So one of the questions which agitated England during the war, "What shall be done with women in the industries?" has quietly solved itself, and it is well within the bounds of past experience for the present labour difficulties to adjust themselves and disappear. A thoughtful Labour man with a wide acquaintance among the Labour leaders in various industries said in the course of conversation :—"The working man has every present intention of getting more pay for less work, and this is the direct result of the extravagant expenditures of the war profiteers, but the only solution I can see to the coming industrial crisis is increased work during the shorter hours our members have already secured."

Four years of war, four years of tense production, have brought in their train an inevitable slackness among the workers due to the removal of the stimulus, and just like a case of bodily overstrain, the recovery will have to be by gradual stages. Herein lies one of the dangers to the English chemical manufacturer. The change in the relationship between Capital and Labour has made his position indeed unenviable, as while the present high

* From *Chemical and Metallurgical Engineering.*

ocean freights protect his home market they prevent him from entering his high-labour-cost products into export competition.

Chemical manufacturers generally express their present fears of American competition in the export trade, and in the domestic trade as soon as trans-Atlantic freights drop from their present high levels. There is a definite trend observable, even in the most casual talks with manufacturers, toward protective tariffs, and it seems certain that attempts will be made to preserve the domestic trade to English chemical manufacturers by the adoption of some form of protection.

An Artificial Lava-flow

An artificial lava-flow, in places 6 ft. thick, was recently formed at a bottle factory in Kinghorn, Fife, by the corrosion of the floor of a tank through the solvent action of the glass. Seventy tons of "metal" were thus liberated, taking five days to cool, and developing, either directly or by contact-action with bricks, an interesting series of rock-forming minerals. The products have been carefully studied by Mr. G. V. Wilson from a petrographic point of view. Corundum occurs as a contact-product with bricks rich in alumina, and sillimanite, similarly developed, proves valuable as a protective lining on the bricks, as was pointed out in the discussion following the paper. Oligoclase arose in the absorption-zone between the bricks and the attacking glass, and small bipyramidal crystals of quartz, like those of many rhyolites, separated out in a portion of the glass that was stained violet by manganese and injected into the bricks after the main greenish glass. It is hence inferred that these later injections consolidated below 870 degrees, and questions of temperature are critically considered throughout the paper. Tridymite and wollastonite were the only minerals developed in the general body of the glass, which is held, on account of the absence of pseudo-wollastonite, to have been at no time at a higher temperature than 1,200 degrees. —*Nature*.

Notices

(Three lines, 3s.; each additional line, 1s.)

G. R.

By Direction of the Disposal Board, Ministry of Munitions.
AT THE SOUTH METROPOLITAN GAS CO'S, WORKS,
OLD KENT ROAD, LONDON, S.E.
To Chemical Manufacturers, Dye Works, Laundries, Engineers, Machinery Dealers and others.

HENRY BUTCHER & Co. have received instructions to sell by Auction on the above premises on Tuesday, August 26th, 1919, at 11 a.m., the EXTENSIVE PLANT and MACHINERY as used in the Manufacture of Synthetic Phenol comprising:

The nearly new KESTNER EVAPORATING PLANT, complete with all the necessary Apparatus, Tanks, Tubes, Receivers, Condensers, &c., capable of dealing with about 10,000 gallons Caustic Soda per 24 hours; 100 H.P. HORIZONTAL STEAM CONDENSING ENGINE by Tangye, 9 ft. × 6 ft.; 9 48 in. diameter CENTRIFUGAL HYDRO EXTRACTORS with plate copper baskets, by Manlove Alliott & Co.; 8 STEAM JACKETTED SULPHONATORS, with special stirring gear (about 800 gallons capacity); 6 REFLUX CONDENSERS fitted with 2 in. lead coils in galvanised iron tanks; 22 PITCH PINE VATS, from 8 ft. to 10 ft. in diameter, assorted lead-lined and plain, and all fitted with Mixers and Gear complete; 8 ditto, new, unassembled; 8 GRINDING MACHINES (Follows and Bute), with spare parts; 2 3-ton "WAYGOOD OTIS" HYDRAULIC LIFTS complete; HYDRAULIC ACCUMULATOR, weighted for 650 lbs. per square inch; 2 3-ton PLATFORM WEIGHBRIDGES (Avery's); 19 C. I. FUSION POTS, 3 ft. 6 in. × 4 ft. 3 in., fitted with stirrers, bafflers, and gear complete; 4 M. S. RIVETTED STILLS, 6 ft. × 10 ft. deep; 8 C. I. EVAPORATING PANS 8 ft. × 6 ft., fitted with stirrers and gear; HYDRAULIC PRESS; 400 W. I. TRAYS, 4 ft. × 2 ft.; the new OIL CAKE PRESSING PLANT, by GREENWOOD & BATLEY, consisting of Distributing Pan, fitted self-contained Driving Gear; 2 HYDRAULIC CAKE MOULDING MACHINES; 4 SELF-FLUSHING ANGLO-AMERICAN OIL CAKE PRESSES, working up to 2 tons per square inch; DOUBLE PARING MACHINE; SET HYDRAULIC PUMPS for operating the above; HIGH PRESSURE ACCUMULATOR, 4 in. ram.

Also large quantities Steel Shafting Pulleys, Bearings, Belting Pumps, Lifting Tackle, Tools, Valves, Cocks, Fittings, Bricks, Timber, Steel Joists, etc., etc.

On view one week preceding Sale from 10 a.m. to 4 p.m. and morning of Sale.

Catalogues and all information from Henry Butcher & Co., Plant and Machinery, Valuers and Auctioneers, 63 and 64, Chancery Lane, London, W.C.2. 'Phone: Holborn 2295.

Situations Vacant.

(Three lines, 3s.; each additional line, 1s.)

Unless specially asked for, Original Testimonials should NOT be forwarded with Applications, but only copies of them.

CHEMICAL ENGINEERING GROUP.—(Society of Chemical Industry). Assistant Secretary wanted at once. Knowledge of shorthand, typewriting and secretarial work an advantage, but not essential. Applications, stating age, qualifications and salary required to be sent to the Hon. Sec., 15, New Bridge Street, London, E.C. 4, not later than Monday, August 18th, 1919.

Situations Wanted

(Twenty-seven words, 2s.; every additional nine words, 6d.)

WANTED.—Gentleman with chemical training who has an up-to-date knowledge of the commercial side of heavy chemicals, to work on a committee with three or four others—to meet fortnightly—to advise lines of development in heavy chemical manufacture.—Box No. 14. CHEMICAL AGE Offices, 8, Bouverie St., E.C. 4.

METALLURGIST and TECHNICAL CHEMIST, Assoc. Inst. M. M., M. Soc. Chem. Ind., wishes Partnership, or Situation with view to same in chemical manufacture, or any new venture with reasonable chance of success. 24 years' experience at home and abroad; knowledge engineering, electricity, and office management; languages, French and Portuguese; good organiser.—Box No. 9, CHEMICAL AGE Offices, 8, Bouverie St., E.C.4.

PRACTICAL CHEMIST is open to undertake analytical or research work. Power-plant Efficiency and Clay Industries a Speciality.—Box No. 12, CHEMICAL AGE, 8, Bouverie Street, E.C.4.

For Sale or Wanted

(Three lines, 3s.; each additional line, 1s.)

SILICA Flour, of all grades, from 20 mesh to 200 mesh; also Extra Fine and Superfine (air-flown) Flour Silica; our 120 mesh grade contains not more than 0·5 per cent. residue on interwoven silk test sieve; fine grinding a speciality; grinding of chemicals and minerals undertaken for the trade.—The Star Quarries, Ltd., Cathedral Chambers, 5, St. Werburgh Street, Chester.

1,000 OILSKINS. Black ex-Naval Oilskin Jackets, 45s. doz.; Oilskin Trousers, 35s. doz.; just the thing to wear for oily and dirty work; cash with order.—Welton, Contractor, Fratton Road, Portsmouth.

WANTED, experimental lab. materials.—W. Pattison, "Widnes."

PETROLOGICAL MICROSCOPES and other Microscopes bought, sold or exchanged. John Browning, (Dept. 24), 146, Strand, W.C.2.